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ELECTRIC REFRIGERATION NEWS

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'36 Advertising Expenditure Is Ahead of 1935

$1,855,668 Spent in Six Months for Magazine Space by 13 Firms

DETROIT—Thirteen leading manufacturers of mechanical refrigerators spent a total of $1,855,688 for advertising space in national magazines during the first six months of 1936, according to figures compiled from recent surveys of expenditures in national magazines.

This is an increase of $61,844 over the amount spent by leading manufacturers for national magazine copy in the first six months of 1935.

Kelvinator led all other manufacturers of household refrigerators in national magazine advertising expenditure in the first half of this year, spending a total of $437,723. Frigidaire was second with a six months' expenditure of $322,850.

In third place among the spenders for magazine space was General Electric with $247,949; fourth was Servel (Electrolux) with $216,975; Westinghouse was fifth, spending $189,250; and Crosley sixth, with $125,234.

Crosley outdid all the other manufacturers in spreading its advertising over the greatest number of periodicals, using 43 national magazines in all during the first six months of the current year.

The *Saturday Evening Post* again was far ahead of any other periodical in the amount of refrigerator advertising carried in the first six months.

The records also show that the National Association of Ice Industries spent $52,475 in national magazine advertising during this period; the Coolerator Co. spent $24,500; and that the McKee Refrigerator Co., another ice box manufacturer, spent $8,766 in national periodicals.

Total amounts spent by the various manufacturers in national magazines during the first half of the year are tabulated on page 2 of this issue.

Policies of Utilities Will Be Discussed At Power Conclave

WASHINGTON, D. C.—Policies and plans of the private and public agencies engaged in the development of power in the United States will be covered in 30 American papers, written by experts for presentation at the Third World Power Conference, to be held here Sept. 7-12, at which 50 nations will have representatives.

Holding companies, public vs. private ownership, national power policies, the reorganization of utility distribution networks, rural electrification, the regulation of the oil industry, conservation of coal, and other phases of power will be discussed from the public and private point of view.

The papers outline the power needs of the nation and discuss them from the standpoint of the practical business man and from that of the government official.

Eighteen topics set forth on the conference program are covered in the papers now prepared. Each subject will be discussed orally at the conference sessions. Of the 41 authors who have worked on American papers, 24 are from private enterprise and 17 are associated with government work.

Climax of the entire discussion centers in the last paper, National Power and Resources Policies, which contains a summation of all other papers.

First paper scheduled deals with "Power Resources, Development, and Utilization," and has been prepared by John C. Parker and Laurence E. Frost, executives of the Consolidated Edison Co. of New York.

Floyd L. Carlisle, chairman of the board of the Consolidated Edison Co. of New York, goes into this subject from a business man's standpoint, discussing whether power development should be a private or a public function. George Soule, economist and editor of the *New Republic*, out-

(*Concluded on Page 2, Column 2*)

Westinghouse Proposal Ranks No. 1 in Bidding on 16,697 Refrigerators for Government Housing Projects

Annual Operating Cost Guarantee May Be Challenged

WASHINGTON, D. C.—With a combination of unit price and guaranteed operating cost as the basis of selection, Westinghouse Electric & Mfg. Co. is low bidder among the eight manufacturers submitting bids to the Housing Division of the Federal Emergency Administration of Public Works for furnishing electric refrigerators for 34 housing projects.

The bids, opened here on Wednesday, Aug. 26, cover the purchase of 16,697 electric refrigerators. The purchase contract has not yet been awarded and it is rumored that the Westinghouse operating cost figures have been challenged by the government.

Manufacturers who submitted bids, in addition to Westinghouse, were Kelvinator Corp., Leonard Refrigerator Co., Universal Cooler Corp., General Electric Co., Frigidaire Corp., Stewart-Warner Corp., and Gibson Electric Refrigerator Corp.

Two bids were required of manufacturers, the first listing total and unit prices of the equipment F.O.B. destination, the second listing the same prices F.O.B. factory. In addition to their price bids, manufacturers were also required to test their machines under a set of specifications issued by the government, to determine the cost of operation over a 10-year period.

A guarantee of the kwh. consumption of the unit per day, and of the operating cost of the unit for a 10-year period, were required to be submitted in the bids.

On a combination of the two factors, unit price and operating cost, Westinghouse's kwh. guarantee of 1.32 gave it a power cost for the 10-year period of only $48.18, and the lowest evaluated bid in both classifications—$115.81 F.O.B. destination, and $114.18 F. O. B. factory. In unit price the company ranked fifth, with $67.63 F.O.B. destination and $66 F.O.B. factory.

Kelvinator, low in the F.O.B. destination bid with a unit price of $61.49, and Universal Cooler, low on the alternate bid with $59.97, submitted kwh. guarantees of 1.55 and 1.6 respectively, making their 10-year operating costs $56.58 and $58.40, and their evaluated bids $118.07 and $118.37 in those two classifications.

General Electric was second to Westinghouse in kwh. guarantee, with 1.42, but submitted unit prices of $68.54 and $66.99 to rank fifth in the evaluated bids.

Leonard, third in unit price, held that rank in the evaluated bidding, showing the same kwh. guarantee as Kelvinator, 1.55. Frigidaire, fourth in unit price, submitted a kwh. guarantee of 1.57 and dropped to sixth in the list with evaluated bids of $121.35 per unit, F.O.B. destination, and $119.81 F.O.B. factory.

Stewart-Warner and Gibson's high unit price bids placed them low in the list, and their kwh. guarantees of 1.6 and 2.1, respectively, did nothing to raise their standing.

Specifications on which bids and operating cost guarantees were based include a stiff penalty on machines which fail to perform according to the manufacturer's estimate. For every one-tenth kilowatt that the unit consumes in excess of the guarantee, a penalty of $3.65 will be assessed against the manufacturer. This is the government's estimate of its cost for that amount of electricity over a 10-year period, figured at the rate of 1 cent per kwh.

As a guarantee of good faith, as well as to cover penalties for possible errors in their performance guarantees, the bidders were required to post a bond equal to 50% of their total bids on the contract.

Firm Name	Westinghouse	Kelvinator	Leonard	Universal Cooler
1. Total Bid (F.O.B. Destination)	$1,129,223.04	$1,026,635.96	$1,045,269.96	$1,029,019.12
2. Unit Price	$67.63	$61.49	$62.60	$61.63
3. Alternate Bid (F.O.B. Factory)	$1,102,002.00	$1,001,519.37	$1,020,127.37	$1,001,319.08
4. Unit Price	$66.00	$59.98	$61.10	$59.97
5. Kwh. Guarantee (per day)	1.32	1.55	1.55	1.6
6. Power Cost (10 Years)	$48.18	$56.58	$56.58	$58.40
7. Evaluated Bid (No. 2 plus No. 6)	$115.81	$118.07	$119.18	$120.03
8. Alternate Evaluated Bid (Nos. 4 & 6)	$114.18	$116.56	$117.68	$118.37
Rank	1	2	3	4

Firm Name	General Electric	Frigidaire	Stewart-Warner	Gibson
1. Total Bid (F.O.B. Destination)	$1,144,491.22	$1,069,286.81	$1,213,703.63	$1,192,902.45
2. Unit Price	$68.54	$64.04	$72.68	$71.38
3. Alternate Bid (F.O.B. Factory)	$1,118,470.00	$1,043,562.50	$1,184,752.61	$1,160,441.50
4. Unit Price	$66.99	$62.50	$70.96	$69.50
5. Kwh. Guarantee (per day)	1.42	1.57	1.6	2.1
6. Power Cost (10 Years)	$51.83	$57.31	$58.40	$76.65
7. Evaluated Bid (No. 2 plus No. 6)	$120.37	$121.35	$131.08	$148.03
8. Alternate Evaluated Bid (Nos. 4 & 6)	$118.82	$119.81	$129.36	$146.15
Rank	5	6	7	8

Porcelain Institute Convenes Oct. 1-2

CHICAGO—Sixth annual meeting of the Porcelain Enamel Institute will be held in the Hotel Statler, Cleveland, Oct. 1-2. Opening day will be devoted to sectional meetings of the institute divisions, and the annual meeting proper will convene the following day.

George F. Taubeneck, editor of ELECTRIC REFRIGERATION NEWS, will speak on the second day's program. Mr. Taubeneck, who has just returned from an extended trip around the world, during which he gathered a mass of interesting information, is scheduled to speak on "What the Rest of the World Thinks About Porcelain Enamel."

Although the program for the two-day meeting is incomplete, those who have already agreed to speak include: R. G. Calton, Institute president and vice president of the Tennessee Enamel Mfg. Co.; Wm. Hogenson, president of the Chicago Vitreous Enamel Product Co.; and E. L. Lasier, vice president of the Titanium Alloy Mfg. Co.

Other speakers will be R. A. Weaver, president, Ferro Enamel Corp.; Rudolf W. Staud, sales promotion and advertising manager, Benjamin Electric Mfg. Co.; George S. Blome, vice president, Baltimore Enamel & Novelty Co.; and Richard H. Turk, vice president, Porcelain Enamel & Mfg. Co.

Mr. Staud, chairman of the Institute's legislative committee, will discuss the Robinson-Patman Act. This act will have pronounced effect on the entire porcelain enameling and

(*Concluded on Page 2, Column 3*)

Loecher Will Supervise Westinghouse Dept. Store Sales

MANSFIELD — Appointment of Adam F. Loecher as department store supervisor of Westinghouse Electric & Mfg. Co. has been announced by R. C. Cosgrove, manager of household refrigeration sales.

Mr. Loecher has had 10 years' experience in the department store and refrigeration wholesaling and retailing field. In his new position he will have supervision of all department store contacts, and direction of sales promotion, advertising, and educational work in department store sales. He will also direct the relationship of Westinghouse refrigerator distributors with department store organizations.

The appointment became effective Aug. 15. Mr. Loecher will maintain his office at Westinghouse merchandising division headquarters here.

Crosley Field Man Forms Distributing Firm

SAN ANTONIO, Tex.—Harry L. Roper, for seven years Crosley district manager in the state of Texas, has organized the Alamo Distributing Co., Inc., with headquarters at San Antonio, to distribute Crosley radios, electric refrigerators, washers, and other products. Mr. Roper is vice president and general manager of the new company.

Succeeding Mr. Roper as district manager in his old territory is H. F. Clayton, for four years sales representative for Prima Manufacturing Co. in Ohio.

Utility Sales Show Big Gain So Far, Bosworth Says

CLEVELAND—Sales of electric refrigerators and electric ranges on the part of public utility companies are far ahead of last year, and sales activity on these appliances has continued throughout the summer, declares H. H. Bosworth, manager of the central station sales for General Electric's specialty appliance sales division.

"In past years," he says, "the central stations' selling activity on refrigerators and ranges has been confined, generally, to the two peak months of April and May. Usually, the utilities go on to other activities in the summer. However, this year the central stations' merchandising departments have continued refrigerator and range activities throughout the summer and they still are doing a good business with both appliances.

"More and more utilities, too, are becoming interested in the kitchen promotion program of the Edison Electric Institute and are tying in with that program."

Among central stations which are doing an outstanding job in the sale of these appliances are the Iowa-Nebraska Light and Power Co., Montana Power Co., Public Service Company of Colorado, Utah Power & Light Co., Puget Sound Power & Light Co., Arkansas Power & Light Co., Mississippi Power Co., Gulfport; Texas Power & Light Co., Central Power Co., Corpus Christi, Tex.; Wisconsin Power & Light Co., Georgia

(*Concluded on Page 2, Column 3*)

1,737,100 Units Sold in 7 Mos. By All Firms

July Sales of 221,500 Better Total for 1935 by 33%

DETROIT—July world sales of 221,500 household electric refrigerators by manufacturers to distributing outlets, as estimated by ELECTRIC REFRIGERATION NEWS, toppled all sales records for the month established in previous years.

The July sales represent an increase of approximately 33% over the sales in July, 1935, and bring the estimated world sales for the seven months to 1,737,100 units.

Household electric refrigerator sales reported by 15 reporting members of the Household Refrigeration Section of the Refrigeration Division of National Electrical Manufacturers Association (Nema) were 206,019 units, as compared to sales of 152,364 units reported in July of last year.

World sales of commercial refrigerating machines reported by 15 companies who are members of the Commercial Refrigeration Section of the Refrigeration Division of Nema totaled 25,556 units. While no comparable figures for previous years are available, this is probably the greatest number of commercial units that have been sold in any July in the history of the industry.

In the various subdivisions of commercial sales, water coolers and bottled beverage coolers maintained the fast sales pace which they have been setting all year, while the sales of 1,404 self-contained air conditioners reported in July were only 250 units less than the number reported in the peak month of June.

For a complete tabulation of both household and commercial sales by Nema member companies see page 16 of this issue.

Ice-O-Matic Man Sets $10,021 Sales Mark in 5 Weeks

BLOOMINGTON, Ill.—Carl Marcus, Williams Ice-O-Matic refrigeration salesman, sold $10,021.75 worth of electric refrigeration in a five-week period in this town of 30,930 inhabitants.

Mr. Marcus worked up the following weekly volume during the five weeks: for the week ending May 2, $1,431; May 9, $1,139; May 17, $2,374.25; May 24, $1,286; and for the week ending May 31, $3,791.25. Besides household cabinets, three ice cream cabinets and a water-cooling installation were included in the total volume.

For a 10-week period, in which the five weeks mentioned were included, salesman Marcus sold 97 household Ice-O-Matic refrigerators. He did this during a campaign in which two low-priced cabinets were spotlighted as lead-off models. Of the 97 sales, however, only 10 were on lower priced units.

Among the "how's" behind Mr. Marcus's selling accomplishments are his methods of meeting the price conscious prospect.

"Better things always come a little higher," is his wedge-point.

When the housewife cites price as a barrier, Mr. Marcus says:

"You probably never went to buy a $5 dress without seeing one for $10 that looked better, which you liked better, and which you finally bought."

Evening calls are an essential part of Mr. Marcus' procedure. During April and May campaigns, there were only two evenings (exclusive of Sundays) on which he did not do some prospecting.

Number of calls per customer, the salesman estimates, averages about three per sale. This ordinarily means one home call, one showroom demonstration, and one call to see the husband and wife together.

Mr. Marcus believes that electric refrigeration selling is a year-round proposition. From his observations, he contends that there are but four months out of the year in which the average family does not take ice—December through March. Because of this, Salesman Marcus rates the fall season highly in sales possibilities.

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COPELAND

COPELAND'S background, ability and product are founded upon matured experience with the requirements of electric refrigeration.

Copeland introduced the first successful automatic electric refrigerator 19 years ago. Since that memorable day Copeland's entire resources, talent and ability have been concentrated upon electric refrigeration.

Copeland Units are considered to be the finest type of precision-built mechanisms. This fine Copeland line should be **your** line. A few territories are available. Write.

COPELAND REFRIGERATION CORPORATION
Holden Ave. at Lincoln
DETROIT, MICHIGAN

Conference Papers Cover All Phases Of Power Field

(Concluded from Page 1, Column 1)

lines a policy delving into the economic fundamentals of the question.

The significant technical, social, and economic trends in the development of resources are discussed by Dr. Vannevar Bush, vice president and dean of engineering of the Massachusetts Institute of Technology, and Dr. Harlow S. Person, consulting economist.

Dana Durand, former head of the Bureau of Census, discusses statistics from an international standpoint. Two papers have been written on the subjects which deal with organization and policies of the coal industry by Isador Lubin of the Commerce Department, and J. P. Williams of the National Coal Association.

Papers on oil subjects have been prepared by Joseph E. Pogue, E. DeGolyer, Noel Robinson, Robert E. Hardwicke, and Myron W. Watkins.

The gas industry is discussed by Judson C. Dickerman of the Federal Trade Commission, and Leon J. Willien, Harry E. Bates, G. M. Davidson, and R. M. Bussard of the American Gas Association.

Organization of electric and gas utilities, including holding companies, has been analyzed by J. F. Fogarty, president of the North American Co., and Robert E. Healy, member of the Securities & Exchange Commission.

Similarly the paper dealing with public regulation of electric and gas utilities is discussed from the industry's side by John E. Zimmermann, president of the United Gas Improvement Co., and from the public side, by William E. Mosher, Syracuse University, and James C. Bonbright of the New York Power Authority.

Organization and operation of publicly owned utilities is covered by E. F. Scattergood, who manages the Municipal system of the city of Los Angeles.

Large-scale national and local planning—what the Federal Government should or should not do—are points taken up by W. S. Finlay, Jr., president, West Penn Electric Co., and Stuart Chase, the writer economist.

Conservation of coal, oil, and natural gas resources are subjects of the speeches prepared by the U. S. Bureau of Mines. Among those who worked on these papers are George S. Rice, A. C. Fieldner, and F. G. Tryon.

"Planned Utilization," heads the paper which explains the roles of the federal government and of private industry in bringing about efficient utilization of water resources, compiled by Harrison G. Roby of the Byllesby Co., and Arthur Morgan of the Tennessee Valley Authority.

Dr. H. H. Bennett, the chief of the Soil Conservation Service of the Department of Agriculture, has prepared a paper on "Utilization of Small Water Powers."

The question of the distribution of, and charges for, electric energy, with emphasis on the possibilities of rate reduction, is discussed by President Norman R. Gibson, and Alexander Forward of the Niagara Eastern Power Co., and by J. D. Ross of the Securities & Exchange Commission.

Under this section comes rural electrification. Hudson W. Reed, United Gas Improvement Co., discusses this question from the utilities standpoint; Harcourt Morgan of the Tennessee Valley Authority, outlines the government program; and Antonio Lucchetti, engineer, tells of work on the Island of Puerto Rico.

Nations to be represented at the conference include: Algeria, Argentina, Australia, Austria, Belgium, Bolivia, Brazil, Bulgaria, Canada, Chile, China, Colombia, Costa Rica, Cuba, Czechoslovakia, Denmark, Dominican Republic, Ecuador, El Salvador, France, Germany, Great Britain, Greece, Guatemala, Honduras.

Hungary, India, Irish Free State, Italy, Japan, Lithuania, Latvia, Luxembourg, Mexico, Netherlands, Netherlands East Indies, Nicaragua, Norway, Peru, Poland, Puerto Rico, Rumania, Sweden, Switzerland, Union of South Africa, Uruguay, Russia, Venezuela, Yugoslavia, and United States.

Through a group of three dimensional electric-current load graphs, the living habits of a half a dozen typical cities are shown. This exhibit gives a useful picture of a city's electrical power needs for any hour of the day, or any time of the year.

The National Electrical Manufacturers Association has prepared a panorama of pictures, showing the many uses of electricity in industry and in the home.

Exhibit of the Boiler Manufacturers Association contains boiler models, drawings, and pictures illustrating all types of boilers from early models to the latest and most efficient.

A small-sized revolving model, showing a farm before and after electrification, has been entered by the Rural Electrification Administration.

Supervisor

ADAM F. LOECHER
Newly appointed supervisor of department store sales for Westinghouse Electric & Mfg. Co.

Porcelain Enamelers To Meet in Cleveland

(Concluded from Page 1, Column 2)

associated industries, in the opinion of the Institute officials.

The program of the Institute's Educational Bureau for 1937 will be the subject of discussion at the afternoon session of the annual meeting.

Features of this session will be a report by Bureau Chairman Lasier, followed by reports and proposals of Mr. Smith, chairman of the Industry Contact Section; H. D. Chase, Chicago Vitreous Enamel Product Co., chairman of the advertising and sales promotion section; Mr. Blome, market research section chairman; Mr. Turk, technical research chairman and Herman L. Cook, Norge Corp., chairman of the recently formed production control section.

Election of the board of trustees, officers, and members of the executive committee for the coming year, will follow the report of the nominating committee, of which Frank E. Hodek, Jr., vice president of the General Porcelain Enameling & Mfg. Co., is chairman.

A general report on what has been accomplished by the Institute since its organization six years ago, and an outline of activities for 1937 will be presented by George P. MacKnight, who recently returned as secretary of the Institute.

Bosworth Says 40,000 'Liftops' Are in Use

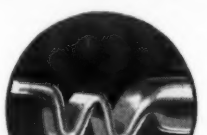
(Concluded from Page 1, Column 4)

Power Co., Alabama Power Co.; Public Service Company of New Hampshire, Cumberland County Power & Light Co., Portland, Me.; Tidewater Power Co., Wilmington, Del.

Bosworth reported that more than 40,000 General Electric "Liftop" refrigerators now are in service in homes throughout the country. A large percentage of these refrigerators have been sold by central stations, many of them being put in homes on a trial basis and later being converted into larger models.

Among companies which have done an outstanding sales job on "Liftop" refrigerators this year are the California-Oregon Power Co., Kansas City Power & Light Co., Penn Central Light & Power Co., Altoona; Mountain States Power Co., and Georgia Power Co.

Why
This Seal Is IMPORTANT



To prevent the inside surface of Wolverine Seamless Copper Tubing from losing its original silken surface, we solder-seal it.

You get it from your jobber in neat coils, crepe-paper wrapped and all ready for the best job.

Use the tubing preferred by most manufacturers and service men.

Wolverine Tube Co.
1411 Central Ave.
Detroit, Mich.

Kelvinator Expenditure of $437,723 Is High For Magazines in First 6 Months

Kelvinator Group

Kelvinator Corp.

Saturday Evening Post	$178,260
Collier's	95,020
Woman's Home Companion	36,054
McCall's	32,475
American	23,100
Good Housekeeping	19,800
Liberty	14,190
Time	13,034
Esquire	7,590
Fortune	5,280
New Yorker	4,400
House & Garden	4,320
House Beautiful	3,960
Graduate Group	300
Total	**$437,723**

Frigidaire

Frigidaire Corp.

American Weekly	$103,500
This Week	69,000
Saturday Evening Post	58,400
Ladies' Home Journal	25,650
Collier's	23,600
Good Housekeeping	18,000
Literary Digest	12,900
Liberty	8,600
American Legion	3,200
Total	**$322,850**

General Electric

General Electric Co.

Saturday Evening Post	$ 92,000
Ladies' Home Journal	45,000
Collier's	33,500
American	18,500
Good Housekeeping	18,000
Better Homes & Gardens	16,000
American Home	11,520
House & Garden	5,850
House Beautiful	3,600
Holland's	2,835
Sunset	1,144
Total	**$247,949**

Electrolux (Gas)

Servel, Inc.

Saturday Evening Post	$ 64,400
Collier's	35,100
Good Housekeeping	24,000
McCall's	23,400
Liberty	17,200
American	13,500
Time	12,825
Cosmopolitan	12,600
Better Homes & Gardens	12,150
House Beautiful	1,800
Total	**$216,975**

Westinghouse

Westinghouse Electric & Mfg. Co.

Saturday Evening Post	$ 83,950
Collier's	50,300
Good Housekeeping	27,000
American	14,000
Cosmopolitan	14,000
Total	**$189,250**

Crosley

Crosley Radio Corp.

American Weekly	$ 19,024
Saturday Evening Post	15,500
Liberty	13,505
McCall's	12,075
Good Housekeeping	11,394
Time	7,187
Collier's	3,633
Woman's Home Companion	3,237
Ladies' Home Journel	3,207
True Story	2,898
American	2,772
Cosmopolitan	2,709
Pictorial Review	2,439
Better Homes & Gardens	2,394
Household Magazine	2,205
Delineator	2,016
National Geographic	1,950
Literary Digest	1,830
New Yorker	1,537
Woman's World	1,512
Redbook	1,260
American Home	1,094
Home Arts Needlecraft	974
Parents' Magazine	969
MacFadden's Women's Group	756
News Week	755
Fawcett Women's Group	714
Popular Mechanics	675
Popular Science Monthly	630
Photoplay	621
House & Garden	600
Modern Magazines	588
True Detective Mysteries	441
Fortune	414
Christian Herald	378
Harper's Bazaar	225
Holland's	210
Vogue	210
Scientific American	177
Sunset	168
Arts and Decoration	150
House Beautiful	138
Town & Country	63
Total	**$125,234**
National Farm Magazines	507

Leonard

Leonard Refrigerator Co.

Saturday Evening Post	$96,600
Total	**$96,600**

Norge

Norge Corp.

Saturday Evening Post	$28,500
Good Housekeeping	21,000
Ladies' Home Journal	19,800
Collier's	18,750
Total	**$88,050**

Fairbanks-Morse

Fairbanks-Morse Home Appliance, Inc.

Saturday Evening Post	$20,000
Good Housekeeping	12,000
Collier's	8,250
Total	**$40,250**

Hotpoint

Hotpoint Refrigeration Division, General Electric Co.

Saturday Evening Post	$24,000
Total	**$24,000**

Gibson

Gibson Electric Refrigerator Corp.

Good Housekeeping	$ 1,996
Woman's Home Companion	1,800
Saturday Evening Post	1,680
McCall's	1,638
American Weekly	1,190
Liberty	718
Literary Digest	630
Collier's	595
Parents' Magazine	540
American Home	294
Total	**$11,081**

Copeland

Dallas E. Winslow, Inc.

Fortune	$550
Total	**$550**

Stewart-Warner

Stewart-Warner Corp.

Sunset	$286
Total	**$286**

Ice Refrigerators

National Association of Ice Industries

Saturday Evening Post	$19,500
Woman's Home Companion	10,925
Good Housekeeping	9,000
Ladies' Home Journal	8,550
American	4,500
Total	**$52,475**

Electrolux (Kerosene)

Servel, Inc.

National Farm Magazines	$46,390
Farmer's Wife	8,500
Total	**$54,890**

Coolerator (Ice)

The Coolerator Co.

Saturday Evening Post	$16,000
Collier's	8,500
Total	**$24,500**

McKee (Ice)

McKee Refrigerator Co.

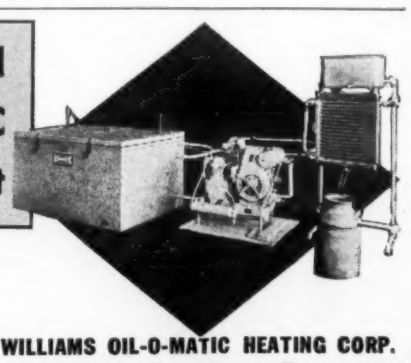
This Week	$4,407
American Weekly	4,359
Total	**$8,766**

Kold Keeper

The Kold Keepers

Popular Science Monthly	$70
Total	**$70**

Why it's easier to sell Williams ICE-O-MATIC milk cooling equipment



1. Made by the makers of the world's largest manufacturers of oil burners —Williams Oil-O-Matic.
2. More flexible—all styles and sizes —electric or gasoline drive.
3. Costs less to run. Quieter operation.
4. Uses Methyl Chloride. Gives faster cooling.

Write for details of franchise now

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World's Largest Specialists in Temperature Control
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WILLIAMS ICE-O-MATIC REFRIGERATION

One-Time Electrical Service Man Finds Personal Contacts & Follow-Ups Best Sales Building Tactics in Small Town

By Eleanor Blum

WALLED LAKE, Mich.—Close personal contact with each of his customers and a consistent effort to be known in the lake district and rural section as a "square shooter" are among the chief factors in "Larry" Gilliam's record of 45 Kelvinator sales since the first of the year.

Mr. Gilliam, who has had the Kelvinator franchise only since October, has a rich background of varied selling activity and electrical repair work in this territory. Formerly a salesman for an automobile agency handling refrigerators, during the depression Mr. Gilliam rented a shack and set out from house to house to obtain small electrical repair jobs.

Even now, people for whom he has repaired a vacuum cleaner for fifty cents, or mended an iron for a small part of a dollar, remember him, and voluntarily add their names to his prospect list. (He still has a good electrical contracting business.) Such personal contact he says, is the only real basis for salesmanship in a rural community.

Used Equipment Brings Leads

He describes his present shop as "rather junky," for he carries very little new merchandise on the floor. Used furniture, washers, and refrigerators were for a long time his standbys and even now bring him many useful leads.

"We capitalize on our policy of obtaining Kelvinators directly from the branch office," he said. "When you back your truck up to the door with uncrated merchandise on it, the customer knows he is not getting used or damaged goods."

Christened Lawrence T., Mr. Gilliam is proud of the fact that more people in the community know him as "Larry" than by his formal name.

Old customers, wanting a refrigerator, often call him in, and say: "Larry, what will you offer for that chair, table—or other piece of furniture."

Hired Repair Man

Finding that service work and selling was too big a combination to handle alone, Mr. Gilliam hired a good repair man, so that he can confine himself almost entirely to selling. While he is on the road, his wife cares for the store.

Although refrigerator sales are falling off so that he now sells only about one a week, however during May, Mr. Gilliam said, he sold 20 new units. He has already received some advanced payments on orders for next year.

His selling average on the Maytag, Thor, and A B C washers he handles is two a week.

Classified advertisements in small town papers in the district (Northville, South Lyons, and Milford) bring him many times the return expected from so small an item, Mr. Gilliam claims. The Milford paper, exceptionally small, has the biggest sales pull, perhaps because city connections there are the most remote.

How He Advertises

A simple insertion, such as "Buy Your Kelvinator from Larry Gilliam" acquaints the readers—who regularly scan the liners and classifieds for fruit sales, hired help, farm equipment, and milch cows—with his name, and with the idea that he handles Kelvinators.

Another of his best advertisements, this dealer believes, is his well-kept, scarlet-colored repair and delivery truck. It is on the road almost constantly.

"Paradoxically," Mr. Gilliam said, "I believe in cold canvass for the rural districts only when it is not cold canvass."

In other words, he explained, the farmers would distrust anyone with whom they were totally unfamiliar. If, however, he had time to go from house to house, the number of repair jobs he has done, his long residence in the district, his advertisements in the small papers, and familiarity with the sight of his red service truck would make them trust him and listen to his story.

On Approaching Farmers

Farm territory is not worked as well as it should be, he maintains, for there is a wealth of sales lying there for a person who goes after them in the right way, he believes. One difficulty he has encountered is a dearth of salesmen, and especially salesmen who know the people and the territory.

Farmers are approached by a lot of salesmen who give them the idea that persons with something to sell are out to "stick" them, says this Kelvinator dealer. Their sales resistance is at its lowest when the milk check comes in, or when one of the farm boys is working at Ford's or some other industrial plant, bringing in ready cash, and has a liking for conveniences.

Old customers are good sources of prospects here as in other communities, it was learned. Mr. Gilliam uses the Kelvinator Friendship Bond for refrigerators, and also offers a $2 "tip fee" on washing machines.

This dealer has no maximum price for an ice-box trade-in; he estimates their value just as he would estimate the value of a mechanical refrigerator trade-in.

Call-backs are an established practice with him. He makes a practice of calling at least three times on new customers; thus establishing his reputation for always "making good" on anything he sells.

The cottage market has been very slight, so far, Mr. Gilliam says, for few persons want to put in a mechanical refrigerator for the few summer months and then leave it all winter. He has a few customers for whom he moves the refrigerator at certain times of the year regularly, from city home to cottage, and back again.

Illinois Northern Utilities Sells 363 Units in Day

DIXON, Ill.—Sale of 363 electric refrigerators in a one-day drive is the achievement of employes of the Illinois Northern Utilities Co. here.

L. Matthews earned highest honors by selling 20 refrigerators on the special "Sales Day." Next was Lester Berry, who sold 14.

Bandoli Honored by Associates After a Mock Frontier 'Trial'

DALLAS, Tex.—"Tried" by a frontier court which is one of the sights at the Texas Centennial Exposition, M. S. Bandoli, newly appointed domestic sales manager for Kelvinator Corp., was found guilty, and came out of the ordeal the possessor of a leather portfolio, a scroll of appreciation, and a commission as Texas ambassador of good will.

Mr. Bandoli, who was been southwestern district sales manager for Kelvinator for the past five years, was brought into Judge Roy Bean's court by an old-time sheriff wearing two six guns in his belt, and tried on charges of deserting the state and selling "electrical contraptions" to the people of the Pecos.

Hauling Mr. Bandoli into court was the method used by the employes of the refrigeration department of the Graybar Electric Co., Dallas Kelvinator distributor, to give the district sales manager a send-off surprise party.

Judge Roy Bean's court is a replica of the old frontier court, in a saloon, where this historic old be-whiskered character originally dispensed frontier justice with rugged impartiality. To give authenticity to the scene, six-foot Texans of the present generation impersonate the other court-scene characters.

Mr. Bandoli was lured out to the Exposition grounds by Graham Polk, merchandise manager of the Community Public Service Co., then nabbed by the white-goateed sheriff.

The case of "The People of Texas vs. M. S. Bandoli" gained considerable publicity for the Graybar Co. in Dallas newspapers.

Stands Trial for Being Promoted

M. S. Bandoli, Kelvinator's new household sales manager, is hailed before a "frontier court" (at the Dallas Exposition) on charges of conspiring to leave the state. He had been Southwestern district manager for five years.

Henley Opens Dealership In Montgomery, Ala.

MONTGOMERY, Ala.—H. P. Henley has resigned as manager of the General Electric appliance department of the Frank Tennille Furniture Co. here, and has organized his own company, the Henley Appliance Co., Inc., to deal in electric refrigerators, radios and washing machines. The company has a capital stock of $5,000, with Mr. Henley as president, H. P. Reeves, vice president, and J. W. Henley, secretary-treasurer.

Crosley Dealers Meet in Station WLW Studios

CINCINNATI—Crosley Distributing Corp. of Cincinnati held an open house meeting in the downtown studios of WLW, Union Central Annex, Thursday and Friday, Aug. 20 and 21, for Crosley dealers in Ohio, Kentucky and Indiana. The complete line of Crosley radios, electric refrigerators, washers and ironers, beverage coolers, Coolrest bed coolers and other products manufactured by Crosley Radio Corp. was shown.

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YOUR potential customers are "finance-wise". They spend billions, annually, for automobiles, oil burners, radios, refrigerators, and other electric appliances of household utility. Where the unit prices are high enough to warrant, most of the purchases are made on a time payment plan. But not just *any* plan. They are demanding fair terms, fair treatment and fair understanding of their budget problems in the handling of collections.

This is the kind of service Commercial Credit Company offers through local offices in principal cities of the United States and Canada. It has been a valuable selling aid to a large number of leading manufacturers and their distributors. It has won the confidence and good will of millions of their customers.

For full details of Commercial Credit Company plans, write or phone headquarters or any branch office.

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HEADQUARTERS: BALTIMORE

FINANCING SERVICE FOR MANUFACTURERS, DISTRIBUTORS AND DEALERS THROUGH 170 OFFICES IN THE UNITED STATES AND CANADA

34669

Around the World

With George F. Taubeneck

For 35 consecutive issues, George F. Taubeneck, editor of ELECTRIC REFRIGERATION NEWS, has contributed lengthy accounts of his travels through 32 countries, on a trip Around the World to study foreign markets for refrigeration and air-conditioning products.

Up to this point readers have followed him on a journey across the United States, through Hawaii, Samoa, Fiji, New Zealand, Australia, Papua, Java, Singapore, Penang, Burma, India, Arabia, Egypt, and Palestine.

In the next issue a brief visit will be paid to the island of Malta, followed by a study of turbulent Spain, including a review of forces and counterforces which led up to the present revolution. Letters from subscribers indicate that readers appreciate the extensive "background" material which the editor presents in connection with his study of each country, its cities, its traditions and customs, its people and their habits.

Industry Grows

In industry, as in all else, Tel-Aviv is still building. In the last survey this city was responsible for two-fifths of all Jewish retail trade in the country. The census comprised 3,139 Jewish business enterprises in which 6,205 persons were engaged and in which the turnover exceeded 3,000,000 pounds.

Already the center of light industry in Palestine, Tel-Aviv exports its products in large quantities. From 32 factories in 1919, the number rose to 1,512 industrial plants in 1933 employing 10,039 workers and having an invested capital of 1,787,675 Palestine pounds. Since then approximately 100 more factories and hundreds of workshops have been added.

Of the 18,000 workers in the whole country 11,000 are employed in Tel-Aviv and its vicinity. From the factories there come such products as foodstuffs, textiles, clothing, metal work, wood-work, leather, printing and paper, chemical products, stone, brick, and electrical appliances. The most successful of the industries are those of the building trade and, the newest, the film industry.

Approximately 70% of the electric power of the Palestine Electric Corp. which serves a large area of the country, is used by Tel-Aviv. The quantity of electricity produced by the electric plant in Tel-Aviv alone in 1934 was 8,987,458 kwh. (of which 2,373,039 kwh. was for illumination, and 3,618,065 kwh. for power) as compared with 5,131,013 kwh. in 1933.

The commercial and industrial development of Tel-Aviv has resulted in the establishment of branch offices in the city by many large banks, as well as by steamship and transport companies and insurance companies. In addition to the Jewish banks, Barclay's Bank, the Ottoman Bank, the Banco di Roma, and other well-known banking institutions, have established branch offices in the city.

At the end of 1934 deposits in the Anglo-Palestine Bank (the Bank of the Zionist organization), whose headquarters are in Tel-Aviv, amounted to 6,300,000 Palestine pounds. The annual turnover of the Bank exceeded 170,000,000 pounds (treble the turnover of 1932). This bank has extended its economic activities to include the granting of larger credits in order to assist commercial, industrial, and agricultural enterprises.

A considerable share of the banking business in the city is handled by various insurance agencies, which in 1934 numbered 45, ten of them being Palestinian with headquarters in Tel-Aviv. These companies advance loans for building, industrial, and commercial purposes.

For the benefit of the immigrants who wish to invest money in Palestine a number of institutions offer information and advice. One of these, the American Economic Committee for Palestine, dispensed information on industrial and agricultural undertakings to 1,425 immigrants and tourists during 1934.

They tell me, and I can well believe it, that traffic in this city is estimated to be 12½ times as great as in any city of equal population. According to a census taken by the municipality in July, 1934, traffic in the commercial center of Tel-Aviv had increased by 530% since 1929. It is estimated that 20,000 persons enter and leave Tel-Aviv from the outlying colonies every day, and 4,000 from the cities of Jerusalem, Haifa, and beyond. The "Maavir" omnibus service transports nearly a million passengers a month.

Here, where the trades connected with transport are most flourishing, can be found a third of all the automobiles in the country.

The construction of good roads and the necessity for quick, comfortable transportation between colonies have been the main causes for the boom in automobile ownership in Palestine In 1931 there were 3,843 motor vehicle licenses issued; in 1935 there were 11,874.

Of the grand army of motor vehicles in operation 50% are private, 20% are commercial and the remaining 30% are public conveyances, motor bicycles and tractors. The taxicab business has flourished, and there are now services in almost every town of any consequence.

Buses have become increasingly popular as they have been made more comfortable. Bus lines link colonies and towns and make intra-Palestine travel greater. The routes and the number of buses on each are controlled by the government, and the buses themselves are owned and operated by a cooperative society.

This bright picture of the motor transportation development is dulled by the growing number of traffic accidents. Cold statistics show the facts:

1933— 930 accidents, 79 fatal.
1934—1341 accidents, 154 fatal.
1935—1730 accidents, 153 fatal.

Of these mishaps it is said 20% were due to negligence on the part of the drivers, and 15% were due to excess speed. In an attempt to cut down the toll of traffic a highway code similar to that enforced in Britain has been drafted, and the Palestine Automobile Club has instituted a campaign for safe driving.

Under British occupation Tel-Aviv was regarded as a suburb of Jaffa in all matters of civic importance. In 1934 the city attained the status of a Municipal Corporation, with all the privileges and obligations of the other large cities of Palestine.

The city is run by a council of 15 members elected for five years terms. The council in turn selects a mayor and vice-mayor from among its own members (subject to the approval of the High Commissioner) as well as its Executive and the various committees.

The present mayor of Tel-Aviv—Mr. Meyer Dizengoff—is over 70 years old. He has occupied this office since the founding of the city.

It is interesting to know that the municipality's first loan was obtained in America, which Mayor Disengoff visited in 1922.

Although Tel-Aviv is to a great extent the materialization of private initiative and private capital, the city as a whole is a national creation made possible by *national* energies and *national* capital—a home for the Jews which Hebrews all over the world have worked for.

* * *

Agriculture

It's a great surprise to many people to learn that there are *any* Jews engaged in pastoral pursuits. Many times when I was enthusiastically discussing the development of Tel-Aviv and Palestine before business men in Europe, the question was asked:

"But how can the Jews live in a land where there's nobody but themselves? Whom do they live *off of?*"

The answer is that in Palestine, fired by patriotism, religion, and the sense of opportunity and destiny, Jews are making excellent artisans and farmers.

Today there are some 150 Jewish agricultural settlements in Palestine, many of them cooperative, all of them modernized in equipment and methods.

On these settlements the Jews work in groups of from 20 to 500 or more on land plots ranging up to 1,500 acres. They live together in villages or even in neo-styled apartment buildings!

Citrus fruits are by far the most important crops. But oranges and grapefruit aren't all. Wheat and other cereals are important, as is dairying.

Some of these farms are individually owned and operated. Some are owned by foreign capital, and operated by share-croppers. But most of them have been purchased by Jewish financial agencies, such as the Keren Hayesod, and are practical demonstrations of the communistic principle in operation.

Today the Jews own only-tenth of all the arable land in Palestine. That isn't enough, they feel, and a great drive is now being made throughout the world for contributions to the Jewish Fund so that more land may be purchased.

There are close to 190 Jewish settlements in Palestine, housing 71,000 people and having 375,000 acres of land under cultivation.

These settlements are clustered in four sections of the country—one in the south around Jerusalem and Bethlehem; one along the Mediterranean coast between Jaffa and Haifa; one in the Valley of Jezreel, stretching from Haifa to the River Jordan; and one in the north around the Sea of Galilee and reaching to Metulla at the foot of Mount Hermon.

The "colonies" are mostly of two types: the collective, called "kvutza," and the individual, or "moshav." The latter type is made up of smallholders with leases of land who maintain their family entity and conduct their land-cultivation by themselves, relying on a central organization only for farm machinery, social services and advice.

What they harvest they sell to whom they please for whatever price they can get. One of the chief reasons for forming colonies is that of protection from the Arabs.

In the "kvutza" the principle is "one for all, and all for one." Living and working are communal in nature. Meals are eaten together in one dining hall; everyone has a specific task for which he or she is responsible; shows are enjoyed together in an open-air theater.

Only in sleep is a family to be found under its own roof.

Informality in dress and manner is the rule, the usual apparel being shorts and shirt. Members of the colony treat each other as members of the same family. It is not rare, we heard, for a young man and a young woman to remark casually at the breakfast table that they were married the night before. Money is not needed for life within the community. The only time anyone really needs currency is when the annual two-week "leave" comes around.

A typical "kvutza" settlement is divided into sections in order to split the inhabitants into smaller groups and so maintain simplicity and room. A central group of community buildings is generally surrounded by palm and cypress trees. In this group are the dining room, the laundry, and the school. There are wide lawns watered by a system of garden sprays. Vineyards, melon plots, orange groves, grape-fruit trees, chicken yards, and the regular farm acreage provide work for the most of the inhabitants. Others take charge of village maintenance, cooking, teaching, etc. Everybody has something to do, and does it.

In the north of Palestine is a colony of American Jews, comprising about a hundred families. They have instituted a ten-year plan whereby each member family pays the Keren Hayesod $650 for a seven-acre lease, and works it for the initial ten year period. Mixed farming is the rule here.

At Tel Or, just south of the Sea of Galilee, the Jordan has been rerouted in order to provide the source of energy for the electricity generating plant there. Tel Or is the main source of electrical power for the whole of Palestine.

In the Lake Huleh area, the lake which is the first basin through which the Jordan flows, there is an area of 15,000 acres of marshland being drained and surveyed for cultivation. Settlers have already moved in, and it is probable that the region will become a new centre for agricultural colonization as soon as the reclamation project is completed. A new bed has been dug so that the Jordan may enter the lake, and the course of the river at that point will be under control at all times.

At Nahalal, in the Valley of Jezreel, there is a farm-school for girls, where more than a hundred pupils each term start as milkmaids, and are graduated as expert plough-girls.

I saw a farm at Talpioth, near Jerusalem, run entirely by women and devoted exclusively to the growing of decorative flowers. Another farm on which girls do all the work is located just outside Tel-Aviv, and is devoted to poultry (see picture).

In the coastal belt the main products are bananas and citrus fruits, with an annual production of eight million cases, 75% of which are exported to England.

* * *

Dr. Weizmann

If ever one man can be said to have been the "Father of His Country," then that man is DR. CHAIM WEIZMANN, a Russian Jew who spent a quarter of a century in England before the Armistice.

At the beginning of the World War Dr. Weizmann was a professor of chemistry at Manchester university. He had discovered a new method of producing a chemical needed in the manufacture of certain explosives—a chemical hitherto obtainable only from Germany.

When he offered his formula to the British government, he asked a strange price: deliverance of the Holy Land, to be followed by Jewish immigration and development.

DAVID LLOYD GEORGE accepted the terms, and the recently deceased General ALLENBY carried out the British end of the bargain.

Today Dr. Weizmann is the most important Jew in the world. He is President of the Zionist organization, an international body with more than a million members dedicated to the advancement of the Jewish National Home in Palestine. Any Jew can join by paying a small fee.

Within its capacious democracy are half a hundred smaller organizations each having more or less bureaucratic control of limited affairs. For instance: the Jewish National Fund buys land and raises the money to buy it; the Jewish National Agency controls immigration.

In its streets, in languages, in daily life, in its Sabbath and week-days; in its administrative departments, its judges and policemen, and its places of business, Tel-Aviv reflects the fact that it is an all-Jewish city, the "First Hebrew City," entirely built by Jewish labor.

Exiles of Israel from all over the world, from Yemen and Persia and Morocco to Poland and Lithuania and Rumania (every Jewish community in the world has its representation in Tel-Aviv) give the city, in spite of its racial-oneness, a cosmopolitan flavor.

Every Jewish crisis sets its stamp on this city. Before the war and in the first few years following the war the majority of the inhabitants of Tel-Aviv were Russian. The economic crisis in Poland in 1924 and 1925 brought a stream of immigration from that country known as the "Fourth Aliyah" which resulted in the expansion and industrial development of Tel-Aviv. The recent troubles in Germany brought 30,000 German Jews into Palestine, about half of whom settled in Tel-Aviv.

The younger generation is being brought up to recognize no racial distinctions, and even the older residents are beginning to be absorbed and assimilated.

* * *

Economic Development

The economic development of Palestine since the Zionist movement got under way may be divided roughly into three periods:

1. 1921-1926—The laying of foundations for today's economic structure.

2. 1927-1931—A period of depression. Consolidation set in toward the close of the era, and signs of internal recovery were discerned.

3. 1932-?—Widescale immigration and the influx of Jewish capital caused unprecedented growth. Observers could marvel at the contrast between Palestine's prosperity and the general world depression.

In the four years from 1931 to 1935 there was introduced into Palestine the huge sum of £30,000,000, which was invested in many types of enterprise. Building, agriculture and manufacturing were the chief beneficiaries. The government treasury also was aided by the income of wealth, its surplus rising from £600,000 to £6,500,000.

Building investments in 1931 totaled £3,000,000, and in 1936 amounted to £7,000,000. The value of industrial output rose from £4,500,000 to £10,000,000 during the same period. Likewise the number of automobiles on the road increased from 4,000 to 12,000.

The tonnage of shipping entered in the ports of Jaffa and Haifa in 1931 was 500,000 and in 1935 totaled 1,500,000. Consumption of electrical power by industry swelled from 4,100,000 kilowatt-hours in 1931 to 22,500,000 kilowatt-hours in 1935.

This amazing growth of Palestine in so short a period of time may well be taken as a forecast of future expansion. Steps taken recently to pave the way for this expected future development included the establishment of an Agricultural Bank with government help, the conclusion of a trade agreement with Egypt, and wider agricultural activities.

* * *

Civil Aviation

Palestine's geographical location has proved to be most advantageous to the development of aviation in the country. It lies in the main air route between the East and the West, and has become a terminal for "legs" of the flights to and from Europe and Asia. It is a resting place on the England-to-Australia route.

This strategic position has ensured for Palestine the benefits of air mail, passengers and goods services.

The government has taken an active interest in the development of aviation by constructing two modern and well-equipped airports, one at Haifa and the other at Lydda, a few miles inland from Jaffa. Of the two the Lydda aerodrome is the largest.

The terminal building includes offices for the air transport companies, an office for the customs department, a post office, a bonded warehouse, mail-sorting rooms, dining-rooms, rest rooms, and even bedrooms for passengers to stay overnight.

The port is equipped with wireless telegraphy and telephone to maintain contact with planes aloft, wireless direction-finding apparatus, meteorological service, an electric beacon to guide machines at night and in fogs, electrically-lit, all-weather runways, and an illuminated wind tee.

Since Palestine itself is not large enough to warrant extensive air services within the country, it is concentrating on becoming a central point in inter-continent transportation.

* * *

Citrus Industry

The orange and grapefruit plantations of Palestine cover some seventy thousand acres, and yield about eight million cases of fruit annually. By 1942 it is expected that the annual output will reach 20 million cases.

In 1930 citrus fruit formed 50% of the total exports of Palestine. In 1934 it was 83% of the total. This great increase in percentage is due not so much to an increase in fruit production as to a decrease in exports of other goods.

Palestine is not permitted to discriminate between good and bad customer countries under the mandate, and is handicapped by not having the power to conclude its own commercial treaties. Hence its imports have increased greatly in recent years, even though the purchases from some countries have fallen off. To illustrate this change we present the variation in percentage of imports of 1935 over those of 1934:

Italy	7% less
Denmark	10% less
France	19% less
Turkey	46% less
Sweden	23% more
Czechosolovakia	30% more
Bulgaria	38% more
Poland	64% more
Hungary	76% more

(Continued on Page 5, Column 1)

Guarding Jewish Farms Against Arab Attacks

1. Palestine farmers must be constantly alert to protect their fields against raids by the Arabs. A horseman patrols the roadway, rifle in hand; the shadows at the road's edge hide armed farmers, on guard. 2. Modernistic dwellings of this type house families who operate farms on a cooperative basis. 3. Another striking example of cooperative agriculture. This chicken ranch is managed entirely by Jewish women.

Around the World

With George F. Taubeneck

(*Continued from Page 4, Column 5*)

The ratio of imports from the exports to Canada has jumped considerably since 1932, indicating the plight of Palestine as regards trade. In 1932 the ratio of imports to exports was 0.6:1, and for 1933 it was 1.1:1. Then came a bigger jump in 1934, the ratio for that year being 2.2:1. The 1935 ratio was not as greatly increased, because Palestine's exports to Canada took a sharp upswing. The ratio was 2.6:1.

It is evident, then, that Palestine's exports need to be boosted a lot in order to bring about a near-balance of trade. A country that buys 2.6 times as much as it sells is not considered to be in a "sound" position. Protective tariffs and subsidies to industry, the principle followed in America, England, Japan, Germany, and other prosperous countries, are unknown in Palestine.

Palestine is quite unable to defend her own interests under the Mandate. Despite this handicap Palestine's industrialists are trying hard to expand the markets for their goods, and toward this end an Association of Palestine Manufacturers has been organized.

* * *

Jerusalem

Outside of three immediate factors: (1) the arrival of HAILE SELASSIE, (2) a day spent with half a dozen delightful people of my own age—for the first time during this trip, and (3) some time spent in the editorial rooms of the *Palestine Post* amidst a staff atmosphere which reminded me of that existing at 5229 Cass Ave., Detroit, the most interesting thing in Jerusalem to me was the Hebrew university.

This was founded in 1918 by Dr. Weizmann, who had arrived as chief of the Zionist Commission. Situated on Mount Scopus, from its heights one can see Old Jerusalem—the Walled City, the Garden of Gethsemane, Mount of Olives, two of the three supposed and quarreled-over sites of Christ's Crucifixion, the Jordan River and Valley, the Mountains of Moab, and the Dead Sea. Also the Mosque of Omar, now the seething heart of Arab foment.

Among the separately housed colleges are the Faculty of Humanities, the Einstein Institute of Physics, Institute of Science, Institute of Mathematics, and Institute of Chemistry and Medical Research. (What a haven for *German* scholars). There are also an Assembly Hall and a Library.

The latter contains more than 320,000 volumes including the world's largest collection of books on and by Jews and Jewry.

Outside the old Walled City has sprung up a New Jerusalem. I think it would please Jeremiah and the other Old Testament Prophets who foretold its glories.

Wide clean streets, fine shops, handsome residences, creditable landscaping and arboreal development, modern public buildings—including an ambitious set of elaborate Zionist organization offices.

Incidentally, opposite the palatial King David hotel stands the biggest and best-looking YMCA building this writer has ever seen!

* * *

Genuine Antiques

Jerusalem's buildings and ruins are a cinematic composite of antiquity. Portrayed in brick, stone, and clay is a historical story 3,000 years old. In the southeastern sections, the city of the Jebusites and the city of David have yielded up memorials. The Western, or Wailing Wall, and "Robinson's Arch" speak silently of David and Solomon's days.

Unrolling successive periods are remains of the capital of the Judean Kings and their tombs; caves of Zedekiah and Jeremiah, and Hezekiah's tunnel—ruins which are remains of the period of the First Temple; tombs and relics of the Persian period, of the Hellenic period, and of Simon the Just.

Carrying the modern traveler to his "amo, amas, amat," days, are ruins of the Wall of Agrippa. Tombs of the Sanhedrin of Herod's reign, and relics of Jerusalem's conquerors and destroyers abound within the city's walls.

Preserved in their original form, one finds the domes of the first Caliphs in the Temple area, the Church of the Crusaders, and the antiquated wall originally built by the Kings of the Ottoman House.

The street of the Jews, one more monument of Jerusalem's persecuted past, is rich in interest for the pilgrims and visitors to the Eternal City of the Jewish race.

Jerusalem's people fit this panoramic setting. Against this antiquated background, the Moslems from Egypt, North Africa, and from other lands, pilgrim Jews, and Christians representative of 10 or more sects, mingle together, until Jerusalem's streets are like a huge religious tapestry nailed to the sky, and raveling a little at edged sections.

Here are Greek Orthodox and Latin Churches, Greek Catholics, United Syrians, United Armenians, and Protestant churches, among which are the Nestorian, Copt, Assyrian, and Abyssinian.

United by their race and religion, and knit together by their eternal hope and the fate which has been theirs down through the ages, the Jews are a national body, as compared with Jerusalem's other multi-religioned groups.

Despite their uniformity, the Jews are distinguished one from another by the countries of their birth, their languages, and manners. Of the entire number of Jews in the city, approximately one-half are Orientals. There are the Sephardim, descendants of the exiles from Turkey, Spain, and the Balkan States; North Africans, from Tripoli, Algiers, Tunis, and Morocco; Syrians, Yemenites, and Babylonians, Daghestanis, Bokharians, Persians, Kurds, Georgians, Crimeans, Urphalis, and others.

From all countries of the world there are Jews returned to pray before the Wailing Wall, and find freedom among the Judean hills. Unhappy eyed Semites have come from Russia, Poland, Hungary, Rumania, Czechoslovakia, Germany, America, Holland, and England. In addition to the Ashkenazic Jews, there is also a small Karaite community.

* * *

Variegated Population

Colorful as a stained glass window is a quickly caught impression of the "quarters." Huddled in close proximity are the Bokharian quarter, the Yemenite quarter in "Beth Israel." Near by is the Hungarian quarter, touched by the Ashkenazic and Polish sections of Meah Shearim.

Western Jerusalem houses the Persian section, near which are the Kurdish, Urphall, and Halabi quarters, and another Yemenite section. The Shepardim of Spain and Jews of other countries are housed in this area.

Containing about one-tenth of the population of the country, and approximately one-fourth of the urban population, Jerusalem at the present time has the largest population among the cities of Palestine, although it is in danger of losing its position to Tel-Aviv.

Jerusalem's population was divided into the following groups at the last official religious census: Jews, 51,222; Moslems, 19,784; and Christians, 19,335. The total number of inhabitants, as shown in the 1935 census, is 120,000. Deducting certain Jewish quarters from the urban area of Jerusalem, the Jewish population, according to the most recent official census, still represents 56.6% of the population.

Second largest community in Jerusalem are the Moslems; the Christians are third. Nine years ago the Christians, representing 23.5% of the general population, held second place. Now only 20.5% of the population is Christian.

* * *

History in Tabloid

Passing over the ancient Jebusite era, Jerusalem's history can be said to cover a 30-century period.

Following its first 1,000 years of triumphant accomplishments, Jerusalem basked in its fame for its second historically important era; only to fall beneath the feet of a conquering enemy. Bereft of her glory, she was no longer the seat of kings, and except for the period of the Crusaders, was not Palestine's capital.

Caesarea on the Mediterranean's shores seized upon the destruction of Jerusalem to build herself up as the seat of the Roman and Byzantine rulers.

Conquered by the Moslems, Jerusalem was never re-established in her former glory. Following the Moslem conquest, the kings of the House of Umaya ruled over Judea and the territory of the Jordan, from Damascus; and Caliphs of the House of Abbas and the House of Fatmah held sovereignty over Judea, through their governors who were centered in Ramleh.

Next the Crusader rulers crowned themselves Kings of Jerusalem, and held high their symbolic crosses there for 90 years. It remained a province during the period in which the Egyptian Mameluks and the Turks ruled, until the British occupation.

Since its last conquest the Land of Israel has been a political unit, with Jerusalem its capital, administered under British trusteeship.

* * *

Topography (Old City)

Built in the days of the Sultan Suleiman the Magnificent, ancient, massive stoned walls enclose the "Old City," one of the two physical divisions of Jerusalem. Enclosing an area of less than a square kilometer, the circumference of the wall is approximately four kilometers.

Although eight gates were provided to connect Jerusalem with the outside world, only seven of them are opened. The eighth, the Gate of Mercy (located on the east side), is walled up in accordance with Jewish tradition, to remain thus until the coming of the Messiah, the Son of David.

Excluding the Temple area, which occupies a separate space, the Old City is divided by its principal streets into four squares. The Armenian quarter is in the southwest; the Christian Greek and Latin quarter is in the north; the Jewish quarter lies to the east of the Armenian, and east of the Christian center, is the Moslem quarter.

Surmounted by two mosques, Mount Moriah, or the Temple Mount is located in the southeastern part of Jerusalem. The mosques are: The Dome of the Rock, or the Mosque of Omar (built over the rock claimed to be the one to which Abraham brought his son Isaac to be sacrificed), and the Aqsa Mosque, or Midrash Shlomo. Beneath the latter mosque, are Solomon's stables.

To the west of Aqsa Mosque is the Wailing Wall, in front of which, thousands of pilgrim Jews who have come from all parts of the Diaspora, have prayed.

The Christians in Jerusalem chose to settle near the Church of the Holy Sepulchre, which they believe to be Golgotha, where Jesus Christ was crucified, and later rose from the dead.

The Mosque of Omar is held in special reverence by the Moslems, who regard it as the third holy center after Mecca and Medina.

Jerusalem began to spread its boundaries into suburban areas outside of its Walls in 1860. First settlements were beyond the city's southern gate, where only a handful of Moslem and Christian houses had been built. Mishkenoth Shaananim (Montefiore), was the first Jewish colony built there. Further expansion was then made outside the northern wall.

After the German and Greek colonies were settled, and the railway station built, the Jews commenced building activities in the south, and constructed Talpioth, the first modern garden city.

Next the Workers' Settlement, founded on Keren Kayemeth land south of Talpioth, the orthodox quarter of Mekor Haim, another Workers' Settlement in Ramat Rachel, and the Women's Training Farm, were built in quick succession.

Northern Jerusalem houses the Georgian quarter (which was built up near the Damascus Gate), and Nahlath Shiva and other sections near the Jaffa Road and extending as far north as Lifta Village.

In this new city topography, the Jewish quarters (Meah Shearim, Beth Israel, etc.) and the Hungarian quarter, are centered on the east side of the road as far as the neighborhood of Simon the Just.

Still farther from this settlement, a little to the northwest, the Jewish communities stretch as far as the Bokharian quarters. Other newer Jewish sections are Shmuel Hanavi Road, and Mahanaim and Sanhedria near Nahal Egoz.

The Mount of Olives, just east of Jerusalem, on which Christ prayed before his betrayal, has been known as the Jewish cemetery from time immemorial. For hundreds of years aged Jews have come back to the Holy City to live their last days, and to be buried here.

Mount Scopus, beyond the Mount of Olives, houses the Hebrew University and the Jewish National Library.

* * *

Economic Activity

In its industry, commerce, and economic activity, Jerusalem takes a secondary position to the newer cities of Palestine, Tel-Aviv, and Haifa.

Its income is derived from the contributions of tourists and pilgrims, and from religious and charitable institutions. It has grown because its ruins hold interest for the pilgrims of three great religions who come to pray within the city's walls, and to visit haunts hallowed with religious significance.

For centuries Jewish people have been going back to Jerusalem on religious and sentimental pilgrimmages. Those for whom returning was an impossibility have considered it their duty to maintain and support the Jews within the City, whom they look upon as the "Guardians of the Walls."

It is claimed that the existence of the Jewish community in Jerusalem has been at no time completely interrupted. Though shackled by the

(*Concluded on Page 6, Column 1*)

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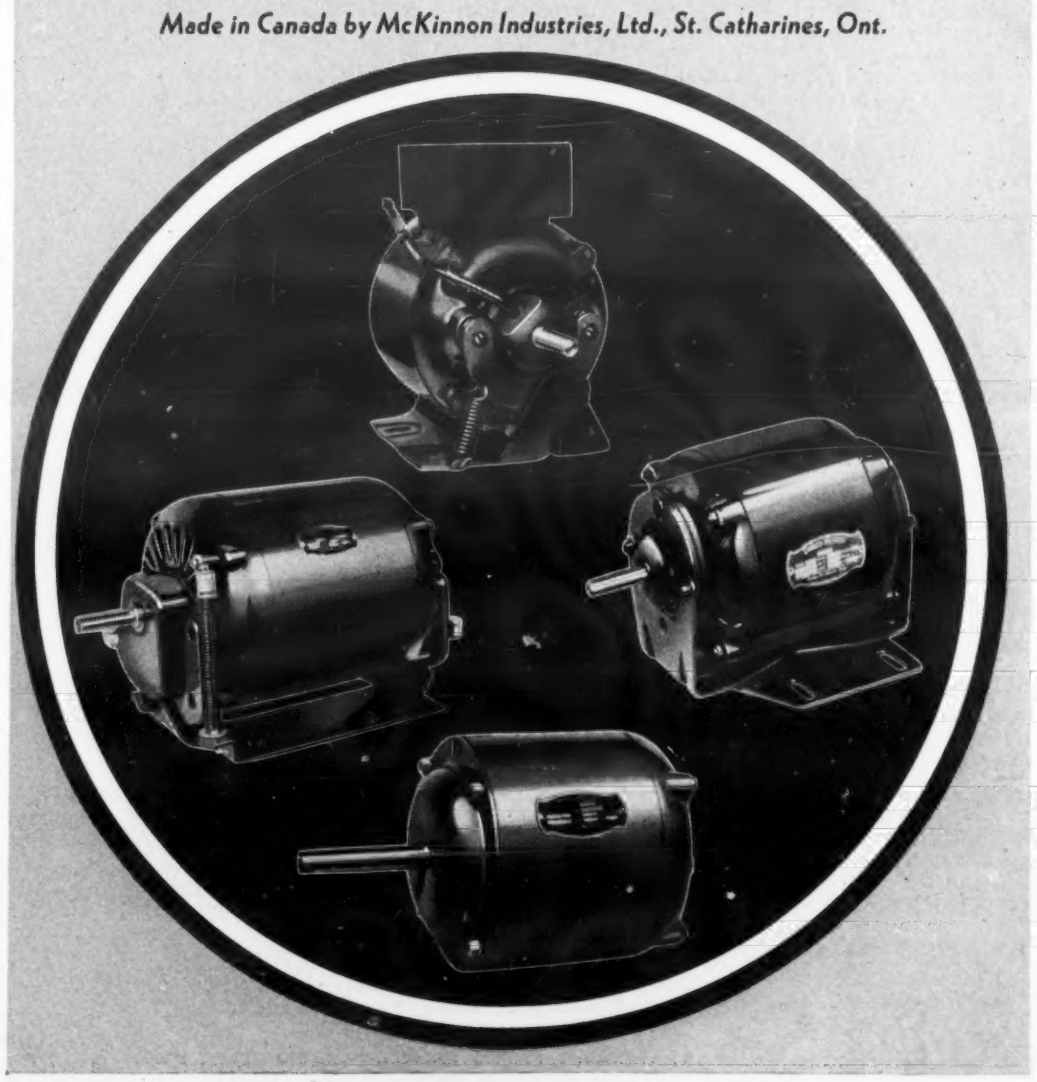

Around the World

With George F. Taubeneck

(*Concluded from Page 5, Column 5*)

persecution of pagan Roman rulers, and of the Christian Byzantines who threatened with death those who transgressed their edicts, the Jews continued to remain in the Holy City. The Community now there was revived by Rabbi Moses ben Nachman, in approximately 1266.

Nor has the immigration of Jews to Jerusalem ever ceased completely. From the Islamic countries, Babylon and Egypt in particular, Jerusalem's sons returned even before the Crusades. From western countries came pilgrims to Palestine during the Latin period.

Significant to Palestine's present history was the visit of Maimonides during this period. Victorious at Saladin, he invited all Jews to return to their country, and promised them freedom and peace.

Over 300 Rabbis, fleeing from France and England, accepted the invitation, Jewish history shows. These were followed by refugees from Spain whose influence was felt upon the Jewish community at Palestine during the next four centuries.

When Palestine was conquered later by the Turks another link in the hegemony of the Spanish Jews was added. Thus a line was forged between Palestine and the great Spanish communities which settled under the rule of the Ottoman Kings.

The Sephardim, or Jewish people of Spain or Portugal-Jewish extraction, then developed a rule that each of its members should make a pilgrimage to the city of Palestine at least once during his life time, and bow before the ruins of Jerusalem, and pray at its Wailing Wall.

From this group of pilgrims who returned, a large number took up their residence in Jerusalem. Its Jewish colony was later augmented by the Ashkenazic Jews. Of this group, many came in conjunction with the Messianic movement of Judah the Hassid, and later, through the coming of the first Hassidim.

Following this came the disciples of the Gaon of Vilna, who laid the basis of the old type of Ashkenazic Jewish community. Consolidated in the 19th Century, this colony was the cornerstone for the present Jewish community.

Of the many foreign born Jews who settled in Jerusalem, the Ashkenazic and the Sephardic were the dominant communities. They became rooted in Palestine throughout successive generations, and left a permanent mark upon the country. The Sephardic element gradually assimilated the Arabic-speaking Jewish community which had preceded them.

Towards the latter part of the 19th century other oriental groups appeared, immigrants from Yemen, Persia, and Babylon, Kurdistan, Bokhara, Georgia and Daghestan, Damascus, Aleppo, and Egypt. Other Jewish pilgrims came then from East European countries, from England and America, and more recently, Jews fleeing the Hitler persecutions, have come to Palestine from Germany.

Held under the thumb of tyrannical rulers, the Jewish community was for hundreds of years imprisoned within the walls of the "Ghetto" of Jerusalem. When political tyrannies were allieviated slightly, when the country was held by Mohammed Ali, and later, by the Turkish rulers who commenced to institute reforms, the Jews broke from the barriers of the Old City, and started building new quarters outside of the walls.

* * *

Poorly Housed

There are at present nearly a hundred Jewish quarters spread in the Jerusalem area. Built to solve the imminent problem—living accommodations—the structures are as lacking in beauty or planned architectural design as a kitchen of the 19th century American farm type.

But there is a rugged fascination about the shambling, sardine-packed, narrow-streeted communities one finds in the older sections of Jerusalem.

Goaded by necessity, the Jews were forced to build some of their small communities right in the midst of an Arab settlement, so that they were hedged in by people to whom killing an unbeliever meant a sacred honor, and earned for the murderer peace in a future existence.

Under such circumstances, no effort was made to establish correctly planned or healthful quarters. This building activity did not step up progress of the industry itself, nor effect a closer union among its workers. It was homes the people needed, and all other goals lost significance under this need.

However, conditions changed for the better early in the 20th century when Jews began flocking to Palestine from eastern Europe, bringing with them methods and manners cultivated in lands where living standards were on a richer and more luxurious scale.

Following the World War the Jews really turned their minds to scientific building settlements. New tracts of land were purchased for urban sites and for the building of modern residential sections.

At this time the section known as the Garden of Antimos was purchased and turned into a new business street, called Ben Yehuda St. In another section, Rehavia, which has become the most modern residential quarter in the city, was built. Next the New Commercial Center was established, and another quarter, joining Talpioth with Ramet Rachel, will eventually house a new community.

In the western part of the city other tracts of land were bought for modern settlements. Givat Shaul was built on one of these sites by members of the old Yishub even before the War. Here, side by side, live Ashkenazic and Oriental Jews. Here also, a number of new industrial centers were built. This construction era took as its next step the establishment of Kiryat Moshe, Beth Hakerem, Bait Ve'gan, Naveh Shaanan, B'ne-Brith, and others.

These new settlements are both modern, and in a sense, model communities. They present a new outlet for the expansion of Jewish Jerusalem, now far-outgrown her walled-in proportions. So far, some of the public institutions have been transferred to this new Western section.

High on Mount Scopus the Hebrew University and National Library have been erected; the Teacher's Seminary is at Beth Hakerem; the central buildings of the Keren Kayemeth, the Jewish Agency, and the Keren Hayesod are at Rehavia. Here also, the Jewish National Council, Vaad Leumi, and the Hebrew Gymnasium are located.

There are also two blocks of cooperative workers' houses built in Rehavia, and two smaller settlements for workers are in the localities of Beth Hakerem and Talpioth.

Of intense national importance was the recent project carried out by the Jewish national institutions. Through a contribution of 10,000 pounds from the Zionist Executive, foundations for a drainage system were laid in Jerusalem.

* * *

Jewish Labor

A great increase in the number of Jewish *laborers* in Jerusalem is a result of the absorption of the Jews into the building trades and the building materials industry. Some new buildings in the old quarters, and all of the new settlements, were built by Jewish labor, whereas in the days of the city's first expansion, the labor was done by Moslems or by Christians.

Taken in 1935, the census of workers gives the following classifications (according to professions) of Jewish laborers in Jerusalem: 639 builders and stone workers; 489 employed in public works (painters and plumbers); 151 printers; 117 bakers; 214 drivers; 162 hotel and restaurant workers; 33 leather workers; and 25 barbers.

Besides these, there are domestic servants, clerks, janitors, skilled mechanics, etc. Altogether there are 3,685 organized workers.

Building and associated trades, followed by transport, lead the vocations enjoying most popularity.

Jerusalem offers scope for considerable development, and substantiates the assumption that its population may be doubled or even trebled, when living accommodations can be provided for the thousands of Jews arriving weekly.

Chief obstacle in the path of expansion up to the present time has been the shortage of water. When the system now being installed is finished, water supplied through pipes from Ras-el-Ein will overcome this difficulty. The system's completion, it is thought, will be the dropped flag for further building activity and greater extension.

The Alliance Israelite Universelle Trade School was the first institution to provide facilities for training Jewish children in carpentry, in copper and iron work, and in weaving. Bezalel, another Hebraic institution, gave the workers of the "Second Aliyah" (newcomers from other countries) a chance to learn the methods of building and stone hewing trades, within her walls. At this school also, the old Yishub and oriental Jewish immigrants learned copper and silver work, carpet making, and similar trades.

* * *

Public Institutions

Besides the impetus being given to Jerusalem's growth and progress by its building activities, its economic and industrial life should be increased with the exploitation of the salt of the Dead Sea, and the growth of the potash industry.

Because it is the capital of the country, and therefore the seat of its government and center of administrative departments, and because it is the headquarters of the general consulate of foreign countries, Jerusalem is a city of institutions. Here the officials of religious bodies live, and national institutions include the Keren Kayemeth, Keren Hayesod, the Jewsh Agency, and others.

The Vaad Leumi, or the Jewish National Council, is the ruling body of the Jewish community in Palestine. Its executives are stationed in Jerusalem. A Communal Council serves to unite all the Jews in the city of Jerusalem, regardless of their sect or particular group, under one body. The community also has a number of smaller sections, each with its own social and charitable institutions.

Providing new facilities and well trained staffs to man Jerusalem's seven hospitals, has meant improved health conditions for the city's people.

Jerusalem also has a number of charitable homes to better care for her aged, orphans, blind, and etc.

Exercising tremendous influence on Jerusalem's social and economic progress, the Keren Hayesod, main financial instrument of the Jewish Agency, has spent a total of £1,846,000 on the colonization of two agricultural settlements.

Called Ataroth and Kiryath Anavim, the two farm settlements are now considered among the most successful colonies in the country. They supply both agricultural produce and milk for Jerusalem's people. The two settlements are but samples of the agricultural projects which must be developed near Jerusalem to provide for the needs of the thousands of people returning to it each day, and to insure the city's future growth.

Over a 15-year period, the Keren Hayesod has raised approximately £5,438,000 by means of voluntary taxation. Money collected by this group has been put back into new buildings and new educational and cultural projects for Jerusalem.

The Keren Hayesod also paid part of the educational budget allotment for Palestine; a major portion of which went to Jerusalem because its population contains a relatively greater number of poor people than is found in other communities.

Jerusalem has 30 schools attended by approximately 5,500 pupils. An intense effort is being made through the schools to revive the Hebrew language.

The Gymnasium and the Teacher's Seminary (500 students) are important recent additions to the Jewish educational facilities in Jerusalem. Other institutions are the Lemel School for girls, the Boys' school, and the Tachkemony School.

Two main buildings will govern the course of Jerusalem's future: the establishment of more productive farm settlements, and the growth of its Hebrew community. Its industrial future depends primarily on ability to provide a water supply sufficiently large to meet the demands of an increased population, and to sustain its agricultural efforts.

* * *

Wailing Wall

It is Jerusalem's Wailing Wall, located in the southwestern wall of the Haram esh-Sherif which is truly the problem child of the Arab-Hebrew situation.

Called by the Jews "Ha-Quotel ma-Aravi" (Western Wall) and by the Moslems "El-Buraq," and by western Christians the "Wailing Wall," its physical structure consists only in a short stretch of wall with a paved space in front of it to which Jews from the earliest centuries have come with their griefs and lamentations.

The Moslems called the wall "El-Buraq" after the name of the Prophet Mohammed 's horse, said to have been tethered at this spot. At present the Mohammedans have the property rights to the spot.

From the Jewish standpoint, the idea behind the Wailing Wall is that they have believed from early times that God chose to cast His people from their temple, that He sentenced them to an era of disaster which can end only when the Messiah comes and restores for them their rightful place. Because of this, their people pray before this wall, bringing their petitions and supplications, particularly on their great holy days.

Tradition gradually enfolded this belief regarding the wall, and built around it myths that bound the Jewish heart to its significance. One of these myths was that the wall contained the stones actually used in Solomon's temple.

And with the years the wall stood for the temple itself, in the Jewish mind. Exiled Jews from all over the world who could not return to pray before it, sent money to support other Jews who could do so for them.

Up to the 19th century the Jews were not in any way hindered from worshiping at the Wailing Wall. It has been only since then that trouble has surrounded the few hundred feet of space termed the Wailing Wall.

Early Mohammedan rulers of Jerusalem forbade the Jews to pave the area fronting the wall, or do anything but visit it in accordance with their ancient custom, and second, forbid them to bring into the area any of their "tools or instruments of possession."

Behind these restrictions was the growing fear in the mind of Moslem rulers that the Jews, given a little freedom in the matter, would eventually take the Temple Area and make in the midst of Moslem holy places, a Jewish synagogue.

Up-spurting of the Zionist movement at the end of the world war introduced a new aspect into the situation. Zionist executives looked with covetous eyes on complete ownership of the Wall, thinking that this would serve to bring those orthodox Jews who were still lukewarm about Zionism, into the fold.

With this in mind, the Jewish leaders in the Zionist group tried to buy the wall outright for the sum of £80,000 in 1919. Their offer was refused. From this point on, minor irritations arose in connection with the Wailing Wall, and each incident carried the issue out of the purely religious ground, into an open political and national sore-point.

In their struggle to keep ownership, the Moslem rulers gradually tried to impose more restrictions on the Jews in their use of the Wailing Wall area.

Jews were annoyed by the restoration of a Moslem prayer place in Abu Madian Waqf, located on Moslem property where the wall stands. From this minor mosque the loud prayers of the Moslems became a soul-trying disturbance to the Jews. Then the Grand Mufti opened a new door in the wall of Haram itself, which gave the Moslems access from the mosque to the area in front of the Wailing Wall.

Jerusalem's Hebrews harbor a feeling of bitter resentment that the Wailing Wall is not theirs, that they are bounded by restrictions in using it. They feel that they should own their One Holy Place, the relic of the Temple they have long considered theirs.

Opposing this Jewish bitterness on the subject of the Wall is one equally as intense, and equally (from their point of view) justified in the hearts of the Moslems. The legend they cherish in connection with the wall is that their prophet Mohammed entered the Haram area by the Western Gate, tethered his horse there, and then was conducted by the Archangel Gabriel from the Wall to the Rock of Abraham.

The Wailing Wall is, therefore, the scarred old city of Jerusalem. Today it bristles with bayonets and tin hats, worn by kilted-Scottish troops stationed there because its very existence is potential dynamite.

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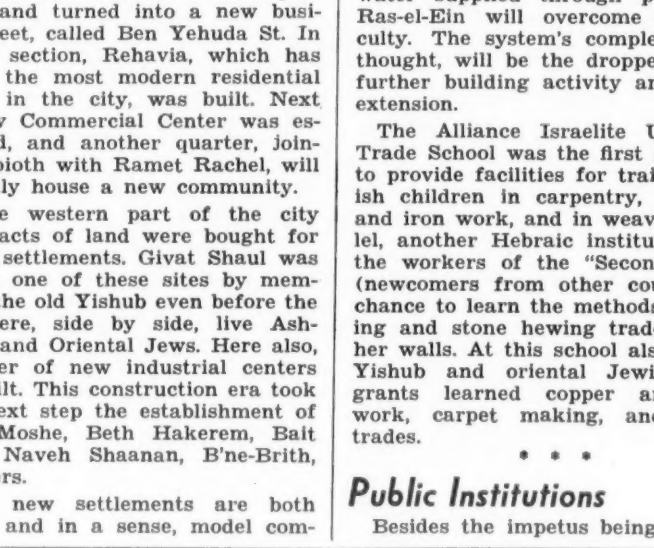

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The Transport & Storage Of Meat

By T. Moran, Low Temperature Research Station, Cambridge

The most important development in the preservation of meat has been the introduction of "gas-storage." In air enriched with 10% of carbon dioxide, the storage-life of chilled beef, mutton and pork is approximately double that in ordinary air, under similar conditions of temperature and humidity. This finding has made possible the trade in chilled meat between Australia, New Zealand and Great Britain.

The successful use of gas-storage is based upon considerations of the retarding effect of the gas-mixture on the growth of meat-attacking bacteria and fungi, and of its effect on the "bloom" of the meat. "Bloom" is also dependent upon the conditions of evaporation of water from the meat, and to some extent, upon the conformation or quality of the carcase.

The complete exclusion of oxygen, or its reduction to a very low level, merits consideration where oxidation of the fat or any other constituent is the predominant change. When stored in ordinary air, the fat of bacon oxidises rapidly, but if stored in pure carbon dioxide or nitrogen, this oxidation is negligible, even after storage for several months. Carbon dioxide has the further advantage that it inhibits the growth of anaerobic bacteria.

The extent of microbial attack on meat during storage depends largely on the steps taken to reduce infection prior to the commencement of storage.

The Chilling of Beef For Export

By C. R. Barnicoat, Dairy Research Institute, Palmerston, N. Z.

The possibility of entering the Chilled Beef Markets of the United Kingdom has interested New Zealand for many years, but it was not until the gas-storage process for beef was developed by the Food Investigation Board of Great Britain that any practical efforts were made to initiate the trade. In June 1933, the first commercial shipment using the gas-storage method was made from Waingawa, New Zealand, in the *"Port Fairy."*

The chilled beef trade is now well established, though still relatively small, as the nature of farming in New Zealand precludes the possibility of any vast expansion of its beef industry.

Scientific observations have been carried out in New Zealand on many of the shipments of chilled beef sent to Great Britain, and have been correlated with reports sent from abroad. The paper submitted gives a general account of the method of preparing beef for the New Zealand "chiller" trade.

Effect of Ozone on the Storage Life of Meat In Cold Rooms

By G. Kaess

Kaltetechnisches Institut, Karlsruhe

The experiments described were made using pieces of meat (muscle tissue) of 2-3 kg. weight stored at a temperature of +3° C., with 90% relative humidity and 3 cm./sec. air circulation speed. Ozone concentrations could be controlled between 0.2 and 400 mg./m.^{3}. At the outset, ozonisation periods of 3 hours were used.

With a concentration of 3 mg./m.^{3}, a sensible reduction in the bacterial rate of growth was obtained. A concentration of 10 mg./m.^{3} gave the additional advantage that, after the first ozonisation period a considerable decrease in the initial germ content was observed. A concentration of 100 mg./m.^{3} gave no really better results. It was not until about 400 mg./m.^{3} was used, that the microbicidal effect was found to last for about 4 days; even in this case, however, the meat could not be kept sterile.

By using ozonisation periods of twice the normal time, no significantly stronger bactericidal effect was obtained except in the case of a 4.5 mg./m.^{3} concentration. Ozone application for two hours twice a day, with intervals of 6 hours between, gave less favourable results than a single daily ozonisation for 3 hours.

Continuous application of 10 mg./m.^{3} for 4 days only very slightly lengthened the storage life. Hence the theory that the essential factor is the *total amount* of ozone absorbed by the meat, independently of the concentrations used, is invalidated.

The absolute value of the lengthening of the storage time obtained by ozonisation is almost constant whatever be the initial germ content. The result is slightly better when the temperature is lowered to 0° C.; it is slightly less good when the relative humidity is reduced to 70%.

At temperature of 3° C., with 90% relative humidity, 3 cm./sec. air circulation speed and ozonisation for 3 hours per day at 10 mg./m.^{3}, a discoloration of the meat is observed after five days. With 3 mg./m.^{3}, this discoloration becomes apparent only after more than 10 days; with 100 mg./m.^{3}, after 2 days.

In practice ,it is absolutely useless to ozonise for longer than 4 days (an extended treatment would result in more rapid bacterial growth than otherwise). A concentration of 10 mg./m.^{3} (three hours per day) may be applied, without the meat suffering discoloration.

The storage life of fresh meat, under the above favorable conditions, may be increased by from 25 to 50%.

Ozone in Cold Storage

By A. W. Ewell
Worcester Polytechnic Institute, Worcester, Mass.

The use of ozone in cold storage plants commenced about 25 years ago and was due to the ability of ozone to oxidize and thus destroy bacteria germs and mould spores and, to a less extent, superficial infection. Practically all of the large cold storage plants in the United States use ozone in egg rooms—a continuous concentration, in the aisles, of about 1.5 parts per million by volume being maintained. In Europe the leading meat storage plants employ a higher concentration during the first day or slightly longer, and a lower concentration thereafter. In both Europe and America ozone is also used to a limited extent with vegetables and fruits.

The use of ozone has been hampered by the unsatisfactory quality and design of a majority of the ozonators on the market, improper distribution and lack of knowledge of the actual concentrations employed, but —most seriously—by the extravagant claims and erroneous advice of promotors. Fortunately, few storage goods are actually injured by ozone at concentrations used in refrigeration plants, the total list comprising only bacon, sausage, lard, butter, cream, dried eggs, mushrooms and bananas. On the other hand, many plants use too little ozone and accomplish little more than a removal of odors and a sweetening up of the storage air. Owing to lack of regular measurements of the ozone concentration and oblivion of the fact that ozone decomposes to one-half concentration in less than thirty minutes in the average egg room, and in less than fifteen minutes in most meat rooms —the amount of ozone supplied is insufficient to effectually destroy bacteria germs and mould spores.

In egg storage rooms in America where ozone is scientifically used, mould is inhibited for eight months despite humidities approaching 90%. The few large American meat rooms which properly employ ozone carry beef at a temperature of about 38° F. and a humidity of 90%, with no mould for eight weeks.

Details respecting the most successful American and European practice in the use of ozone with various products, as observed through intimate connections with some of the largest American cold storage plants and frequent visits to European plants, will be given in the full paper. The results of recent investigations in the writer's and other laboratories will also be given and, finally, a resume of the present status of ozone in the cold storage industry.

The Quick Freezing Process in the Fishery Industry in Japan

By T. Murayama
Nippon Shokuryo Kogyo K. K.

Although Japan adopted the American freezing process in 1918, her fish freezing industry has now been able to emerge from the imitative stage of the Western process after having passed through varied experiences. Many freezing processes and plants have been designed in succession, and the freezing industry of Japan has been firmly established in conformity with the characteristic conditions of the country, in which aquatic products are found in abundance. A general reformation is now taking place in the method of fishing, the rationalization of aquatic industry and the system of marketing fresh fish. Further, the freezing technique has been applied to raw foods other than fish in laboratories, and now the time has come to put it to practical use.

The majority of the existing freezing plants employ the calcium-chloride brine system, and they are giving satisfactory results in the so-called "quick freezing."

In this report are described a few typical examples of these quick freezing plants and also some facts and special features of the quick freezing industry: (1) in Kamchatka, operated by Japanese, (2) in Japan proper and colonies, and (3) in fishing vessels, and also on marketing conditions of frozen fish.

The B. F. Fish Cooling Storage Process

By H. de Bellefon, France

This process is characterized by the fact that the catch as soon as possible is placed in metallic receptacles of appropriate size and having an airtight and watertight sealing. The fish is then cooled down and held at a temperature around —2° C., by subjecting the receptacles to a brine spray at a temperature of —2° to —3° C. In this way, without freezing, fish may be kept in fresh condition for thirty days easily, and in some instances a much longer storage life is obtained. The return brine is collected and recirculated and serves indefinitely.

This storage process has been used on a large scale and without a break since June 1933, and so far has given full satisfaction. It is particularly suitable for the equipment of fishing vessels and the warehouses at fishing ports. The system offers great facilities to fish-markets and retail shops. Aboard liners, its use makes it possible to serve passengers and the crew with fish that has not been frozen and possesses the full flavor and appearance of freshly caught fish.

Considering the very moderate refrigeration temperatures required, the B. F. process is very economical in use.

On the Use of Artificial Cold in the Dairy Industry of Holland

By B. Van Der Burg, Agricultural University, Wageningen, and H. De Kruyff, General Netherlands Dairy Union

Milk is an excellent medium for the growth of micro-organisms. The sooner milk is cooled after milking and then kept at a low temperature, the longer it remains in a condition suitable for consumption. The same can be said of dairy products like butter and cheese. Artificial cold is used in the dairy industry for the following purposes:

1. Cooling of full-cream milk after it is obtained, when it has to be transported over long distances or cannot be pasteurized directly.
2. Cooling of full-cream milk after the process of pasteurization.
3. Cooling of cream after pasteurization to a temperature lower than required for ripening.
4. Cooling of water for butterwashing.
5. Cooling of the cold storage butter and other dairy products (e. g. milk in bottles).
6. Cooling of cheese warehouses.

The writers are aware of the fact that from a point of view of cooling technique, the last few years have not shown great alteration in the dairy industry. However they think it of interest to give a short review of the use of artificial cold in the dairy industry in Holland.

The Control of Conditions In Cold Stores & Ships' Refrigerated Spaces

By A. J. M. Smith, Low Temperature Research Station, Cambridge, and J. K. Hardy, Ditton Laboratory

The subject of control of conditions in stores containing foodstuffs can be conveniently divided into control of temperature, control of gaseous atmosphere and control of humidity.

The problem of controlling temperature in densely packed cargoes has been attacked from two directions: by experiments directed toward improving the structure of the stowage, and, in the case of forced-air system, by experiments directed towards improving both the aerodynamic efficiency of the system, and its effectiveness in equalising temperatures. The practical outcome of these has been the "Tower" system of stowage for stores cooled by roof grids, and the "Jacket" system of air circulation.

Experiments in connection with control of atmosphere have principally been directed toward obtaining on a commercial scale, atmospheres with low concentration of oxygen such as are specified for the storage of Cox's Orange Pippin apples. This has been done by using the respiration of the fruit to lower the concentration of oxygen and removing the excess carbon dioxide by scrubbing. A gas-store of novel construction was used for the experiment.

The effect of the package on the humidity of its contents has formed the subject of a series of experiments.

TENTH ANNIVERSARY NUMBER

SEPTEMBER 9, 1936

Contents

Household Refrigeration

(1) A paper on the development of household refrigeration in the United States. This 30,000 word analysis was prepared by Editor George F. Taubeneck, and presented in condensed form at the Seventh World Congress of Refrigeration at The Hague in June. Its appearance in the NEWS will be the first printing of the complete paper.

Public Utilities

(2) A review of the part public utilities have played in the growth of the household refrigeration industry.

Department Stores

(3) An appraisal of the role of department stores in the development of the industry.

Air Conditioning

(4) The story of air conditioning, and its rapid rise from laboratory to active merchandising.

10-Year Calendar

(5) A calendar of industry events which have occurred in the last 10 years, as reported in the weekly issues of ELECTRIC REFRIGERATION NEWS.

Review of 1935

(6) A history of the eventful year 1935 in the refrigeration and air-conditioning industry.

These six features, outlining the history of refrigeration and air conditioning, will make the TENTH ANNIVERSARY NUMBER of interest and value to everyone connected with the industry. As the supply will be limited, all orders for extra copies should be placed immediately. Price 25c per copy for any quantity desired.

ELECTRIC
REFRIGERATION NEWS
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REFRIGERATION NEWS

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VOL. 19, NO. 1, SERIAL NO. 389
SEPTEMBER 2, 1936

Maybe There's Hope for the TVA

EARLY in 1935 a magazine article by Dr. Arthur Morgan, chairman of the Tennessee Valley Authority, made us stop and wonder a bit. Dr. Morgan, a former college president and apparently a man of the most commendably altruistic principles and purposes, outlined succinctly in this article the vast human needs of Tennessee Valley people, and just how he hoped to better the welfare *and increase the prosperity* of the large region which had been placed under his jurisdiction for a tremendously important socio-economic experiment.

Dr. Morgan's words had the ring of a man who knows what he is talking about, where he is going, and how he is going to get there. They made us wonder whether or not we had got this TVA thing all wrong. So the editors of the NEWS renewed their intensive and extensive investigations of the TVA and its relations to and with electrical appliance dealers. Once more we reviewed the harsh, bludgeoning methods with which TVA men sought to get their own way about matters concerning which they seemed to have but scanty information on which to base their hasty judgments.

And again we got the picture of a brilliant but uninformed young man in a hurry, arrogant in his belief that everything which had been done before was wrong and that he knew just how to right it, militantly crusading against business men who—in his self-righteous, closed-mind notion—were dedicated to the theory that you can gyp all of the people all of the time. We do not refer to Dr. Morgan. The young-man-in-a-hurry was Lawyer David Lilienthal, who seemed to be running things.

Mr. Lilienthal's rough-shod running over business firms in the Tennessee Valley, very small firms as well as very large, did a great deal of damage to the electrical appliance industry; and, to our way of thinking did very little to help advance the noble motives of the cause which evolved from Dr. Morgan's dream.

That Dr. Morgan has himself awakened to the true state of affairs in his project is evidenced in a recent newspaper dispatch. Dr. Morgan is quoted as giving his colleague "unshirted hell" in caustic criticism for his methods, as well as his entangling the project so deeply into partisan politics.

"Lilienthal is further charged by Dr. Morgan," according to the *Detroit Free Press* of Aug. 26, "with spending ridiculously large sums to promote the use of TVA power in southern municipalities. Tupelo, Miss., is cited as a case where the promotion cost ran to about four times the total annual domestic consumption of electricity.

"Most important of all, Dr. Morgan expresses the strongest sort of disagreement with two of Lilienthal's key policies — the 'yardstick' principle, and the use of competitive pressure to compel private utilities to sell properties to TVA at the latter's terms. The TVA chairman characterizes this practice as grossly unfair.

"As to the 'yardstick' idea, he feels it is a grave mistake for a government agency to try to set up a scale of rates as a criterion for private utilities when it is not in fact an accurate measure at all. He agrees with private power leaders that TVA electric production is so subsidized through absence of taxation, allocation of costs to other functions of the Authority, etc., that is absurdly unreasonable to expect private companies to operate at the rates which Lilienthal has established.

"The general impression of those whom Dr. Morgan has interviewed in this vein—most of whom are conservative—is that TVA would be a constructive rather than a destructive force if its chairman were allowed to run it in his own way."

When the electrical appliance industry first heard the story of the Tennessee Valley Authority's aim thoroughly to electrify this great territory, and to promote the electrical home and electrical home servants, there were general huzzahs and rejoicing. "Imagine," cried the optimists, "the *government* promoting our business." The prospect certainly did sound pleasing. More power, extended distribution lines, and cheaper rates, making possible—and made possible by—increased consumption of current through increased use of electrical appliances. Business, it was reasoned, ought to be good for Tennessee Valley retailers!

But lo! Instead of extending the transmission lines and service, the TVA sought to take over existing lines at ruinous prices to stockholders and bondholders, through intimidation. Instead of boosting business for dealers, the TVA forced the utilities back into the active merchandising picture with appliances for sale at cut-throat prices. Instead of stimulating manufacturers to improve products and step up production, the TVA forced them (by threats of going into the manufacturing business itself) to strip current models and cut the prices to a point where everybody lost money, including the customer.

Going further, Mr. Lilienthal and his aides either directly or indirectly instigated the chest model refrigerator, the industry's biggest white elephant to date. The nefarious practice of building last year's models this year to sell at cut prices also followed the never-ceasing pressure of Lilienthal and his gang to get the prices down, no matter what might happen to the usefulness of the product in the process.

As a result, the inferior models put out probably more than offset any goodwill toward electric refrigeration which the government may have sponsored via its propaganda. And the industry received a serious setback in the loss of a large number of good dealers who were either forced out of business by the high-handed proceedings, or quit it in disgust to devote their attention to other lines of merchandise.

Many months ago ELECTRIC REFRIGERATION NEWS declared editorially that while the original TVA idea may have been worthy in motive, apparently it had been steered off onto sidetracks going in the wrong direction. Perhaps the able Dr. Morgan who, after all, is the nominal head of the project, can set it back on the right track.

It has been a common practice of the New Deal to set up some agency with supposedly humanitarian ideals under the aegis of a nationally known man whose reputation would give the project immediate public approval. Then, behind his back, practical politicians from the Farley school would take over the project and manipulate it to increase the strength and grip of the most extensive bureaucratic political machine the nation has ever seen. Many a public-spirited man, angered and humiliated to discover himself a "front" for such nefarious skullduggery, has resigned his post and returned to private life.

Dr. Morgan, however, shows signs of fight. It's about time that one of these "front" men turned the tables on those who have been betraying both him and the public. The refrigeration industry, as one of the affected parties, will watch with interest—and undoubtedly give whatever assistance it can—the efforts of Dr. Morgan to "make an honest woman" out of the TVA.

A New Type of Market Resistance

PUBLIC INTEREST in and enthusiasm for air conditioning is proving to be a great advantage — also a handicap.

In some cases it is a handicap because the public has anticipated engineering development. There is a demand for a perfected product at a low price—a combination which is possible only after the volume of business becomes sufficiently large to justify mass production of a standardized design.

Experience clearly shows that large-scale production of a standardized engineering product is achieved by progressive stages over a period of years.

Even the low-priced automobile, that marvel of American mass-production methods, did not arrive until after many years of progressive development. It should not be forgotten, also, that the path of that progress was strewn with the wreckage of many failures.

In considering the possibility of securing the economies of mass production in the manufacture of a particular product, many people (even experienced business men) overlook one important obstacle to standardization which automotive engineers did not have to overcome.

Automotive engineers did *not* have to figure out how to fit a car *into a house.* The only solution ever found for that problem was to *build another house* (a garage), or a specially designed addition, to fit the car.

Whenever it becomes necessary to fit a new piece of equipment into an existing home, engineers are confronted with an endless variety of conditions which have the effect of defeating their efforts at standardization. For example, look at the wide range of sizes of electric refrigerators which must be provided even after 10 years of mass production!

Obviously the difficulties of standardizing air conditioning equipment will be far greater since it must be fitted into *many rooms* of a single dwelling, in addition to meeting all of the other varieties of service requirements.

Judging from our own personal experience with air conditioning in the offices of the NEWS, from our observations of the progress being made in the various parts of the country, and from our discussions with numerous manufacturing executives, distributors, dealers, and contractors, and from the comments on the subject appearing in the public press, we have no expectation that some bright inventor is going to find the "answer" to air conditioning overnight.

Furthermore, as has been said before in this column, it looks like *selling* is going to be the big problem, just as it was in the case of electric refrigeration. In other words, we believe that the engineers and production men will have no great difficulty in keeping up with the sales departments.

In this connection, perhaps it should be noted that air-conditioning sales managers may encounter *a new type of market resistance* which has not been an important factor in the mass selling of any previous engineering product.

We refer to the militant opposition to all forms of high-pressure selling which has grown up during recent years. A portion of the public is no longer content to resist sales effort by simply refusing to buy. Something in the nature of a movement has been started to combat aggressive salesmanship by *aggressive resistance.*

This new attitude of the public has been dramatized by such organizations as Consumer's Research and its recent rival, Consumers' Union of the United States.

There is no denying the fact that these publishing enterprises (or whatever they are) have gained a considerable following regardless of their poor equipment, erratic leadership, and distorted conception of public service. Incidentally, we still believe that Consumers' Research represents *"a good idea gone wrong"* as was stated in our first comment on this activity.

We are also inclined to believe that some of the manifestations of the New Deal, particularly those in which resentment toward big business has been shown, are due in some measure to this undercurrent of resistance to the exaggerations of national advertising and the high-pressure methods which are inherent in time-payment selling and long-term credits to the householder.

As another example of this aggressive resistance, we are publishing in this issue extracts from an article on air conditioning which appeared in the July 29 issue of *The New Republic.* Those who are familiar with Consumers' Research will recognize the author of this article, Dewey Palmer, who was formerly chief of the "technical department" of Consumers' Research and is now "technical supervisor" of the New Consumers' Union of the United States.

Frankly, we have hesitated to give valuable space to this effusion by Mr. Palmer (it has been standing in type for about three weeks) because it doesn't have anything in it good enough to be rated as information and it isn't bad enough to be worth an "answer."

So far as we can see, there is only one thing about it which is worthy of consideration and that is the point which we have endeavored to make in this editorial, namely; that the selling of air conditioning to the public involves a new problem and that a new technique may be needed to meet the situation.

Letters

Date of Purchase Should Be Stated

James Spear Stove and Heating Co.
1823 Market Street
Philadelphia, Pa.
Aug. 19, 1936

Editor:

In a recent issue of the ELECTRIC REFRIGERATION NEWS, there was the following item:

"PHILADELPHIA—Richmond Engineering Co., manufacturer of Airline water cooler cabinets and low side units for large and small commercial installations, has purchased *the good will and rights* of Spear Stove & Heating Co., former manufacturer of Spear ice water generators, milk coolers, and other low sides."

In the first place, the present management has been operating this company for over five (5) years and *it was prior* to 1931 that the Richmond Engineering Co. purchased *the rights* to manufacture the Spear ice water generators, milk coolers, etc. For this reason, your publication is in error by not specifically mentioning the time at which the Richmond Engineering Co. acquired the rights to this equipment.

Secondly, as you worded this news item, it is grossly misleading, as it conveys the impression that the Richmond Engineering Co. purchased "the good will and rights of Spear Stove and Heating Co."

Will you kindly see that a correction is made in the next issue of your publication.

JOHN M. B. CHURCHILL,
Vice-President

No Contest Involved In Kelvin Home Plans

Kelvinator Corp.
Department of Public Relations
14250 Plymouth Rd., Detroit, Mich.
Aug. 24, 1936.

Publisher:

In the interest of accuracy you will undoubtedly be interested in correcting the impression left in the second paragraph of the story entitled, "Kelvin Homes Are Being Erected by Utility Employes," that appeared in the Aug. 12 issue of ELECTRIC REFRIGERATION NEWS.

The plans from which Kelvin Houses are built were prepared by J. Ivan Dise, architect located in Detroit working in conjunction with Kelvinator's Engineering Department. These plans incorporating provision for year round air conditioning have been prepared for the guidance of the architects and builders, for the design and construction of moderate cost homes. They were not prepared, as indicated in the article, as a result of a nation-wide contest.

E. L. SYLVESTER,
Director of Publication Relations.

Better Understanding of Foreign Countries

Utilities Engineering Institute
404 N. Wells St., Chicago, Ill.

Editor:

Upon reading, this morning, of your return, I cannot pass this opportunity to express my appreciation for the many interesting and informative articles reporting your travels and experiences on your 'round the world trip.

In a number of your articles, we found information of definite value in giving us a better understanding of the problems and local conditions affecting our students in many of these foreign countries.

We are glad to know that these articles will continue.

E. P. SORENSEN, President.

First Class Analysis of Palestine

The Crosley Radio Corp.
Cincinnati, Ohio
Aug. 27, 1936.

Editor:

I am glad to know that you are back safe and sound from a very interesting trip and one that no doubt will be profitable to the electric refrigeration industry, as well as yourself. I have read your articles with a great deal of interest. Your article on Palestine is really the first clear statement that I have ever seen on the situation there, and I was very glad to have it cleared up in my mind.

JAMES W. BECKMAN,
Director of Public Relations.

Please Send Catalogs

Please find enclosed money order for (£ 1.) renewed subscription to ELECTRIC REFRIGERATION NEWS. If you have any catalogs on anything dealing with refrigeration I would be very pleased to receive same.—W. Shiels, Barton Vale, Enfield P. O., Adelaide, So. Australia.

Air Conditioning

Ex-Consumers' Research Official Attacks Air Conditioning Industry's Tactics In 'New Republic' Article

(See Editorial on Opposite Page.)

Air conditioning is depicted as the latest device with which "big business" is going to "shakedown" the public while giving a minimum of benefits, in an article by Dewey Palmer published in the July 29 issue of *The New Republic*. Mr. Palmer, engineer and physicist, formerly head of the technical department of Consumers Research, Inc., is now technical supervisor of the Consumers' Union of the United States, Inc.

Mr. Palmer's affiliation with these two organizations, both of which are notorious for their attacks on the methods and products of industry, may account for the caustically critical tone of the article.

In telling how the public is being "taken in" by manufacturers and sellers of air-conditioning equipment, Mr. Palmer oftentimes refers to excerpts taken from trade journals—and the excerpts are such that a very different meaning is sometimes implied than would be the case if the full text of the article were given.

Mr. Palmer's article makes statements of broad and general implications such as the following:

"Air Conditioning is on its way. It is believed by the heating and ventilating industry that the majority of home owners will have some ready money or can borrow enough to try out the novel experience of keeping cool when the weather is hot. It looks as if the experience is going to cost the home owners of this country plenty."

The magic term, "air conditioning," the author states, "is being used to describe almost everything—fans, humidifiers, odor absorbers, and even underwear and hats. Manufacturers of a radiator evaporator were stopped by the FTC from calling their gadget an "air conditioner"—a ceiling electric fan is called a "Conditionaire"—Continental Motors Corp. has a "conditioner" on the market for $13.50.

Fears Added Functions Will Be 'Forced' on Public

"Refrigerating the living quarters of America's urban population is not the simple and logical next step in an advancing technical state that some promoters of the new mechanized life would have us believe," Mr. Palmer writes.

"Keeping the air around meat and vegetables in a refrigerator at the proper temperature and humidity is one thing, but cooling and controlling the humidity of the air in the average or even better than average house is something entirely different.

"A refrigerator is tightly constructed with walls of insulating material anywhere from two to four inches thick. American houses are notoriously leaky structures."

Cooling and humidity control, however, are only parts of the function of air conditioning, the author points out. True air conditioning, he says, consists of (1) temperature control, (2) humidification, (3) cleaning, and (4) circulation; and some engineers would have the air treated in a variety of additional ways.

One engineer, E. F. Fuller of E. F. Fuller Engineering Co., says that air conditioning embraces 12 processes of air treatment: heating, cooling, filtration, circulation, hydration, dehydration, ozonation, atmospheric pressure variation, chemical treatment, medication, odorization, deodorization.

"Under this definition," says Mr. Palmer, "an air conditioner performing only the minimum functions given above would be referred to as a 1-2-3-4-5-6 system. This classification will enable the industry to make each preceding year's equipment obsolete for six succeeding years by adding one new function annually.

"Human beings are not in any great need of conditioned air," declares Mr. Palmer, "but an expanding refrigeration and ventilating industry is going to give it to them whether or no. The industry has resorted to 'made business' before, and can do it again."

Along this line, the author recalls the history of school room ventilation in which, he says, the standard of 30 c.f.m. of fresh air per person, adopted shortly after the turn of the century through vigorous campaigning by American Society of Heating & Ventilating Engineers, was shown by a survey by the New York Commission of Ventilation in 1916 to be wholly unnecessary.

"The elaborate form that modern air-conditioning equipment has taken is chiefly the result of the industry's drive to sell expensive installations and is in no way related to the needs of the home owner barely able to keep up with the payments on his home," Mr. Palmer asserts. "The same industrial and professional engineering groups that sold plenum systems to the state legislators would now like to force expensive air-conditioning plants into every house."

Attacks Health Improvement Claim

"The chief sales appeal for air conditioning is built around summer comfort—as the hot summer months approach interest in cooling equipment increases. It is generally implied in sales literature that if your house or office is cool your health will improve accordingly.

"In advertising to industry, manufacturers of air-conditioning systems are making much of the reduction of time lost from work as a result of installing air-conditioning equipment. Actually there are few or no experimental data to substantiate any of these claims."

The writer points to a recent paper by Dr. W. J. McConnell of the Industrial Health Section of Metropolitan Life Insurance Co. in which it is stated that in studies in two buildings owned by the insurance company, one air conditioned and one not, there was no appreciable difference in employe health. Dr. McConnell concludes, the article says, that while air conditioning may be beneficial in certain medical techniques, such as special room treatment for some forms of hay fever, anemia, and allergic diseases, there are no data which show conclusively that conditioned air is beneficial to health.

On the other hand, he says, Dr. Lloyd Arnold of the College of Medicine, University of Illinois, has stated that the so-called "comfort zone" (about 70°) is too far below outside temperatures for persons to make a quick adjustment when going from one temperature to another. Dr. Arnold believes, he says, that differences between inside and outside temperatures should not be more than 10° F., possibly less, with a relative humidity between 40 and 50%.

Other hazards accompany air conditioning—hazards about which the average person seldom hears, the author declares.

"In the comparatively large cooling systems necessary to maintain a house at a comfortable temperature in hot weather the quantity of refrigerants may be dangerously high. Any slight leak in the refrigerating plant will result in the toxic fumes (sulphur dioxide and ammonia are commonly used) being quickly spread to all parts of the house.

"An air-conditioning system also increases the ease with which your house may burn down. This hazard lies principally in the ducts through which smoke and hot gases can quickly spread."

Cost Figures Exaggerated

To establish his point that the cost of air conditioning is out of all proportion to its benefits, Mr. Palmer cites the experimental installation in the Detroit Edison Research Residence which he says "shows that when conditions are nearly ideal the costs involved are prohibitive for all save a very small fraction of home owners."

"While actual installations and equipment costs are not given, they must have been in the neighborhood of $400 for the 2-ton refrigerating system used. The operating cost for one season was $11.96. The industry cites this as an example of the low cost of summer cooling. Careful study of the data, however, reveals that the artificial cooling system was only in operation for 14 days during the whole season—that is, it actually cost 85 cents a day to operate.

"To keep the cost of operating the cooling system down as low as possible no outside air was drawn into the cooling air during the period of operation. This in spite of the fact that the heating and ventilating industry, in putting its program over in the schools, insisted that 30 c.f.m. of outside fresh air was essential."

Heating and humidifying equipment must be added, if the system is to be complete, the author says. Equipment adequate for a seven or eight-room house will not cost less than $2,500 and probably more.

Says Experience Has Been Bad

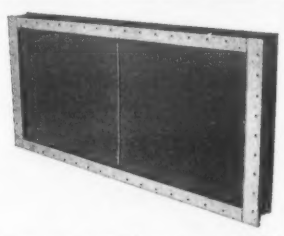
"All air-conditioning systems are noisy . . . Home owners can expect considerable annoyance from their installations in this respect if the equipment is not carefully placed and mounted in such a way that fan noises and vibrations are not carried to all parts of the house.

"At the present time, the most satisfactory installation of air-conditioning equipment has been in large units, such as those used in theaters, restaurants, trains, etc., where the investment has justified the expense of engaging the services of the best heating and ventilating experts available. But in many instances even the large installations have proved wholly unsatisfactory."

Mr. Palmer then quotes from *Heating, Piping & Air Conditioning* a statement that building managers have seen systems wrongly installed; air washers standing idle, or producing too much humidity when they did run; that they have gone into a restaurant for roast beef and come out with a stiff neck; that they have been transported, not painlessly, from July to January in some air-conditioned theaters; that unconditioned apartments often rent for more than conditioned ones.

"If this situation is at all representative of large air-conditioning installations, it is far more true of the smaller equipment now installed or being offered for private residences, where it is not possible to lay out the system and check on all important details of the installation," Mr. Palmer concludes. "Far too many concerns with little financial backing and practically no engineering staffs are offering 'air-conditioning' equipment to home owners. The majority of such units will never operate satisfactorily.

"Homeowners . . . will save themselves another thorough shakedown if they will pass up air conditioning until the industry has put several more years of careful research into considering what is possible and desirable for the average householder."



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For the Comfort of Chicago Shoppers

How ducts were installed in Mandel Bros. store, Chicago. The sign says: "Air Conditioning Keeps Mandel's COOL As a Lake Breeze."

Mandel's Installation Made by Kroeschell

CHICAGO — Year-round temperatures "in the seventies" are now maintained in the basement and first floor of Mandel Brothers department store on State street here by means of air-conditioning equipment installed this year by Kroeschell Engineering Co.

Portions of the existing duct work and fans previously used for ventilating purposes were utilized in the installation.

It is claimed for the installation that the conditioned air penetrates to the most remote corners of the two merchandising floors, and that these results were accomplished without the use of furred in or concealed cut work.

Following are the inside conditions which the system maintains:

For summer cooling, a maximum temperature differential of 15° F., based on 80° F. inside temperatures with 95° F. outdoor dry bulb reading and 75° outdoor wet bulb temperature, relative humidity not exceeding 50% when the outdoor wet bulb temperature does not exceed 75°.

For winter conditions, a minimum temperature of 70° F. with outdoor temperatures as low as —10° F. will be maintained.

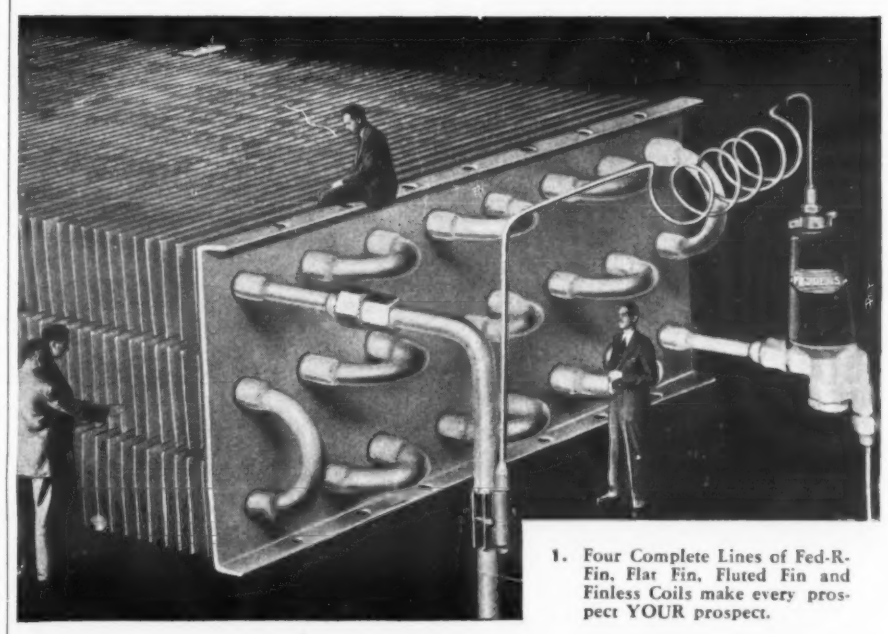
Air conditioning equipment consists of two separate central-station air-conditioners with air distributing ducts.

Refrigeration is furnished by three carbon dioxide compressors; one 50 and one 73-ton Kroeschell horizontal Corliss-engine-driven, direct-connected carbon dioxide compressors; one 95-ton Kroeschell vertical, motor-driven carbon dioxide compressor.

One of the air conditioners with its blower unit is located in the second basement and supplies conditioned air by means of a separate system of ducts to the basement sales space in the Wabash-Madison street building. The other conditioner with its supply fan is located in the third basement and supplies conditioned air by means of a separate system of ducts to the first floor sales space in the Wabash-Madison street building.

Each conditioner is specially designed and is complete with renewable cell type filters, preheaters, reheaters, and finned type dry surface direct expansion CO_2 refrigerating coils.

Ducts were designed to appear as beams and furring was almost entirely eliminated. All elbows exposed to view were made square and equipped with vanes to reduce resistance to the air flow. Ducts exposed to view are painted the same color as the ceilings to which they are attached, and are scarcely noticeable.



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New York, 114 E. 16th St. Philadelphia, 2100 Arch St.

Commercial Uses

How 'Z' Quick-Freezing Process Is Used By the Long Island Duck Industry

By M. T. Zarotschenzeff
Technical Director, "Z" Processes, Inc., New York

THE Long Island Duck Packing Corp. is daily placing some 30,000 lbs. of fresh killed duck on the market in the quick-frozen "Z Pack."

Before the application of this quick-freezing process, duck farmers were confronted not only with the usual hazards of shipping and marketing perishable goods, but they found that their biggest market was in the winter months while the killing time of the ducks was between April and October.

This meant that sufficient numbers of duck had to remain in cold storage until there was adequate consumer demand, in order that the market price might not be destroyed. Excess of kill beyond immediate market demand sometimes reached 50%. Moreover, with the old procedure of sharp freezing and barrel packing, the farmer often found that even when the market price finally justified selling, many of his ducks were unsalable due to freezer burn and deterioration.

Former Icing Process

It has been the customary procedure for each farmer to kill and dress his ducks at home; having been chilled in ice water, the ducks were packed, 30 to a barrel. Plenty of crushed ice was used and the repleted barrels rushed by truck to 14th street, New York City, the center of the poultry trade in the State. In hot weather spoilage was unavoidable. Ducks became water sogged and readily turned moldy or "green."

Ducks not sold on the day of arrival were re-packed and sent to the cold storage to be sharp-frozen. It is natural that a sharp-frozen product, after several months cold storage, should not be of the best quality. The freezer burn and drying out damaged the appearance of sharp-frozen ducks; on defrosting they were not comparable with fresh duck.

Today our chemical and biological knowledge of the effects of slow-freezing has been greatly advanced, and there is an explanation for the inferior quality of both animal and vegetable tissues upon defrosting. Animal tissues are made up of numerous minute cells which are filled with a semi-liquid protein gel. This gel contains a percentage of water in which is dissolved appreciable quantities of salts as well as solid matter.

As the cellular contents are of a colloidal character, ice crystals are produced in the cellular and intercellular spaces when freezing starts. While freezing starts at 31° F., it is not entirely completed until a much lower temperature is reached. As the percentage of water particles is decreased and the solution becomes stronger, the more concentrated is the liquid remaining, and consequently a depression in the freezing temperature. This affords a sluggish physical change and produces a large ice crystal formation.

In slow-frozen flesh products many of the ice crystals grow much larger than the size of individual cells, disrupting and tearing the cell walls and compressing the more resistant fibres into tough layers or bundles. Thus upon defrosting there is a tendency for water to be forced through cell walls causing not only leakage and evaporation of natural juices, but an acceleration of bacterial growth and deterioration.

The zone of maximum crystal formation is found between the temperatures of 31° and 25° F.; three-fourths of the water content is solidified at this point. This is most important, for the freezing temperature is depressed in the duration of this zone and growth of individual crystals is quickened.

Zone of Crystallization

It is logical that the more quickly the temperature of each cell passes through the zone of maximum ice formation, the smaller the crystals will be. Comparative working tests in connection with freezing of ducks have shown that under the "Z" process a 6-lb. duck required 27½ minutes to pass through this zone, while when sharp-frozen the required time was about 250 minutes.

Since time is a factor in crystallization of water the superiority of the "Z" process over the slow-freezing method becomes obvious. Again, the slow-freezing method often requires a temperature as low as —30° F., while the minimum temperature employed in the "Z" process is —5° F. It requires increasing energy to lower the temperature of the product below the cold storage temperature.

In other words, it is unnecessary to freeze the product down to —30° F. if in the next hour the same product will be stored at a temperature of 0° to +10° F.

During the preliminary stages of the installation of the "Z" process at Center Moriches, the Long Island Duck Growers' Marketing Cooperative asked the United States Bureau of Chemistry and Soils to determine whether or not there was any practical value to quick-freezing. The results of these tests are summarized here.

A bacteriological test was made in which two lots of ducks were frozen by the "Z" process, stored for six months, defrosted, and tested; another lot was frozen by the normal commercial method, stored for six months, and tested. Each lot consisted of three ducks and three samples were taken from each duck The first sample represents the count made on sterile wash water after the inner cavities had been flushed three times with sterile water, the fourth flushing being the one used for bacteriological analysis. Counts on Sample No. 1 were expressed as bacteria per cubic centimeter.

Sample No. 2 represents the count per gram of breast meat.

Sample No. 3 represents the count per gram of inner thigh meat.

	Z Frozen	Commercially Frozen (Slow)
Sample No. 1	489,833	2,730,000
Sample No. 2	4,800	2,600,000
Sample No. 3	5,333	1,666,666

The second test made by the Bureau of Chemistry and Soils determined the acidity of fat in per cent of oleic acid. Two tests were made on successive days of separate ducks from each of the lots, the results being as follows:

	Z Frozen	Z Frozen	Commercially Frozen
First Day	.69%	.55%	1.50%
Second day	.69%	.60%	1.31%

Another important point is the appearance of the ducks before defrosting. The lots of ducks frozen by the "Z" process retained much of their original color and bloom and were attractive in appearance. The commercially frozen duck were misshapen and considerably discolored, having a slightly reddish, misty, dead-looking appearance.

Supplementing the tests of the United States Department of Agriculture, the following extraction from a letter written by Mr. W. G. Matteson, President of the Long Island Duck Growers' Marketing Cooperative, Inc. augments these findings. In this case Mr. Matteson conducted a simple eating quality test at his own home.

". . . I conducted one of my own. I had two distinct epicureans, two people who had cooked and eaten ducks for years, and three people just ordinary in ability to pass on food tastiness at a dinner on Saturday evening. Four ducks were served. Two ducks had been quick chilled by the "Z" process and placed in cold storage for six months, the most difficult of all tests for a duck. The other two ducks were killed three days before on my own farm, drawn immediately and then put into an electric refrigerator. Only the maid knew what ducks were being served and the character of them. Even I did not know which ducks were which.

Vote of Dinner Guests

"I asked my guests to tell me which duck was the best. Six voted for ducks served in the order of 1 and 3; one voted for duck number two. The six voting could see hardly any difference between ducks 1 and 3, but thought them far superior to ducks 2 and 4. Ducks 1 and 3 were the quick-chilled "Z" processed animals that had subsequently been put into cold storage for six months.

"It would be quite possible to write a fair sized volume on this subject. But it can briefly be summed up in this phraseology: 'Superior in every degree.' We expect to build a modern plant next spring to handle 15,000 ducks per day. Nothing within the last 20 years has been so revolutionary in the duck business as this application of quick-chilling and the results obtained. You have sometimes wondered doubtless why vegetables picked from your local garden and prepared at once taste so much better than the best fresh vegetables at the most reliable stores.

"The story of 'Bacteria Count' is the true tale. It explains the reason, and since this process has done so much for ducks, the most difficult of all foods to refrigerate and preserve, it must be only a question of time and opportunity before it will be an everyday operation in the preparation of all foods of a perishable nature."

The present day set-up of the "Z" process quick-freezing plant as employed by the Long Island Duck Packing Corporation effects a simple and direct procedure. The refrigeration is furnished by two ammonia compressors, each with a 9¼x19-inch cylinder, fitted with clearance pocket in outer head and a hand operated valve lifter on inner head. There are two Diesel engines.

Special brine cooling and salt dissolving equipment is included in the system. A novel method for continuous filtration of brine is incorporated.

The cold storage plant consists of two rooms, a low temperature storage room and the cooler room. The storage room is 21 feet 3 inches x 19 feet 9 inches, and the cooler room 17 feet 1 inch x 20 feet 3 inches. The height in both rooms is 18 feet 2 inches, unusually large because of specific local conditions.

The roof and floor of the cold storage room are insulated with 8 inches of cork board. The cooler is insulated with 6 inches and 4 inches of cork. The cold storage room is held uniformly at —10° F., and the cooler room at +32° F.

The "Z" quick-freezing equipment consists of a battery of ten compartments contained within two separate cabinets designed to handle 500 ducks each of six pounds average weight per day. Each unit is 17 feet 6 inches long, 3 feet 0 inches wide, and 5 feet 6 inches high, inside dimensions. The interior is fully lined with Monel metal and insulated with six inches of cork board.

A centrifugal pump draws cold brine to the interior pipes, which are connected with atomizer nozzles placed along each side of the compartments. Brine strainers of large capacity, in duplicate, permit cleaning without service interruption.

Placed in Wooden Frames

Ducks are placed in wooden frames on trays, each tray holding 6 ducks. The loaded trays are placed in their compartments and the nozzles atomize a fine mist at intense velocity. A high rate of heat transfer results. Heat absorption occurs by combination of radiation, conduction and convection, giving rapid cooling and freezing without recourse to extremely low temperatures.

The brine vapor moves over the duck at high velocity but exerts no impact pressure, and causes a relative humidity of near 100%, completely eliminating shrinkage of products by evaporation. The brine temperature of —5° F. freezes 6-pound ducks in two hours' time.

After being frozen the ducks are put in special washers where they are rinsed with clear water. They are then dipped in ice water for glazing, which forms an adherent clean coating of ice to protect carcasses from freezer burn during subsequent storage.

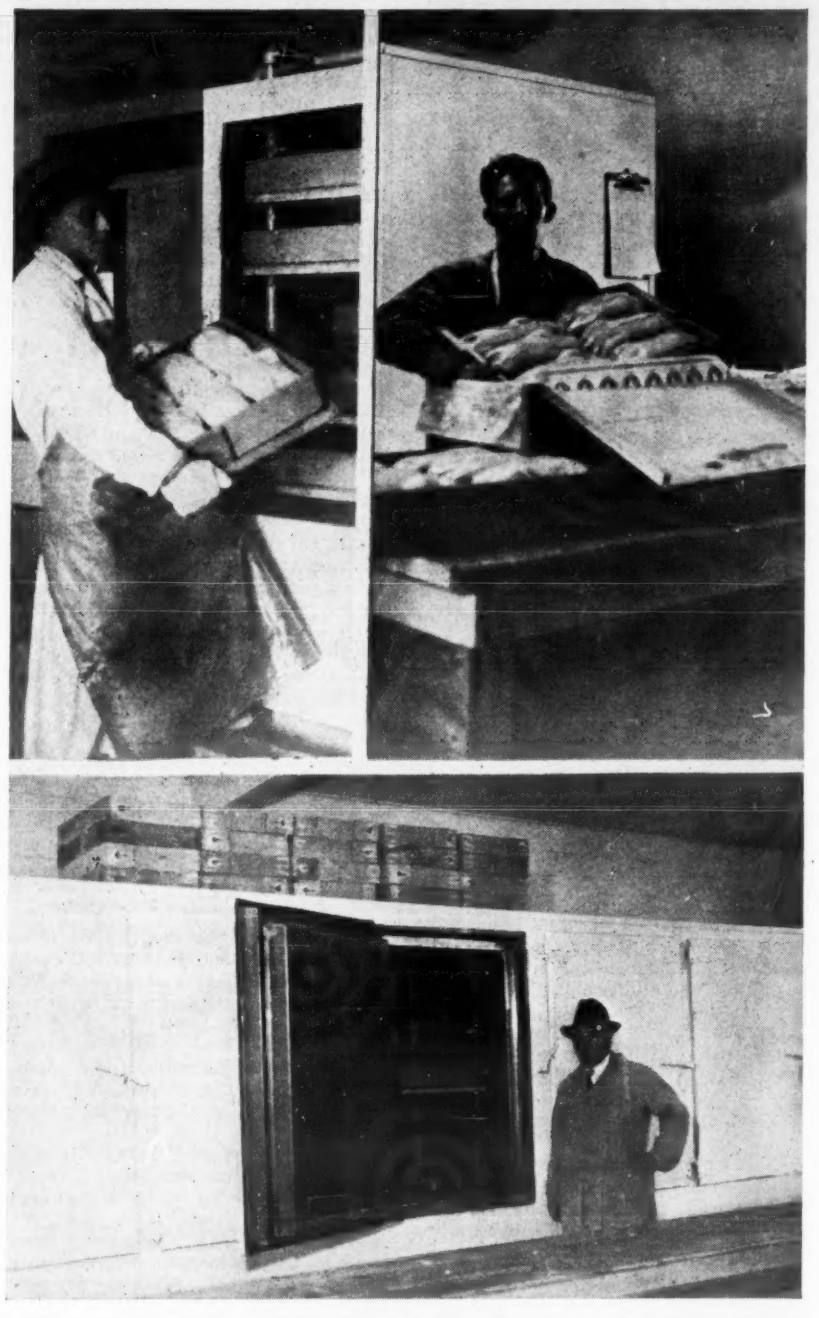
Following the glazing process the ducks are packed in boxes lined with waxed paper, one dozen ducks to a box with an average net weight of 72 lbs. The boxes are transported by means of a conveyor to the cold storage room which is held between —5 and —10° F. Here they await shipment until transported to New York by refrigerated trucks.

As the freezing process is conducted at Riverhead, Long Island, a center of the duck raising industry, the birds are in the freezer almost as soon as they are killed. No time is lost as was in the slow extraction of body heat over a 24 hour period, or in shipping to some distant center for refrigeration.

Once the ducks are hard frozen no further change takes place in appearance or quality until they are defrosted in the consumer's refrigerator or in the retail store.

In a similar manner this improved technique of packing and freezing has stressed a more advanced procedure of feeding. Feed is bought by chemical analysis and its value is tabulated by caloric content. Some of the more progressive farmers add medicinal cod liver oil to the feed, especially during the first few weeks. Others have installed up-to-date automatic machinery for incubation.

Modern Way of Preserving Ducks



Various stages in the "Z" quick-frozen pack process for Long Island ducks. In the upper left the ducks have come out of the freezer and are ready for the washing and glazing process. (Upper right) The ducks are placed in wooden frames on trays, each tray holding six ducks, for the various processing operations. (Below) One of the freezers.

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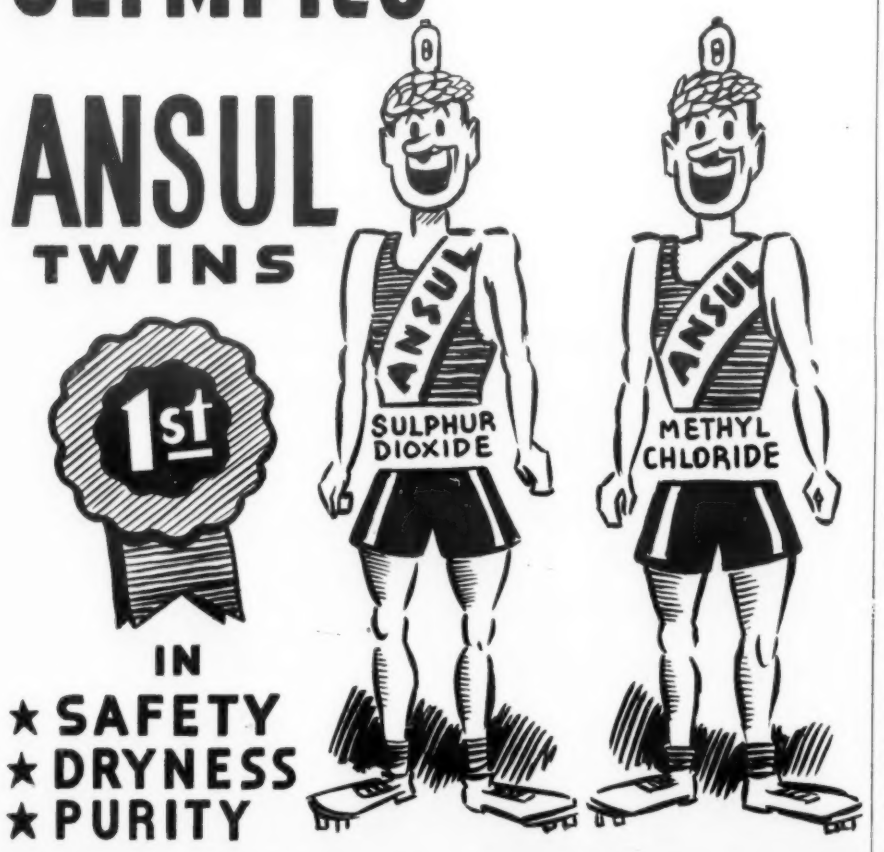

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Design for Two-Temperature Systems Using Pressure Relief and Thermostatic Valves To Produce a Snap-Action Effect

By A. F. Evers, Jr.

(*Editor's Note*: A. F. Evers, Jr., refrigeration engineer of Denton, Texas, has devised a hookup—using three common types of valves—to produce a snap-action effect for one "leg" of a multiple temperature refrigeration system. Mr. Evers would like to hear from service men and refrigeration engineers as to whether or not they understand his explanation of the operation of the hookup, or from any reader who thinks there is a better way of accomplishing the desired effect.)

A multiple temperature refrigeration system is one where more than one temperature is maintained by a single compressor. A two-temperature system is similar to a multiple temperature system but, as the word implies, it maintains only two temperatures.

An outlet valve designed for a multiple temperature system might be called a multitemperature valve, but it is much better understood when called a two-temperature valve.

Simple refrigeration systems where only one temperature is to be maintained are comparatively easy to control. The compressor either runs or it stops and that is the end of it, and though a leaky valve might hinder the operation more or less, it can often be tolerated for quite a while.

With a two-temperature valve in the system operating problems become more complicated. If the two-temperature valve loses more than a small percentage of its efficiency, compound troubles are apt to appear. For this reason any multiple temperature system must be installed with the utmost of care if it is to be depended upon to work efficiently and without attention over a long period of time.

About the most dependable valve to be found in any refrigeration system is the flapper valve in the compressor. Flapper valves have been known to hold better after several years running than a hand operated valve the third time it was run down with a wrench. The secret apparently lies in having the first fit a good fit after which a very uniform and frequent wearing action keeps the valve and seat in perfect trim.

The uniform wearing action is probably due to the fact that no cumbersome control mechanism is attached to the flapper valve, also the incessant free movement has the right sort of wearing effect on the adjacent surfaces.

Following this line of logic, then the best two-temperature system should be the one in which both the evaporator inlet and outlet valves have needles whose movements tend to wear the seat in a gentle, constant and even manner. This would apply also to solenoid valves.

This simple beneficial action is all very well for the two-temperature valve itself but it calls for more running time on the part of the compressor. The problem then, is to produce an arrangement which will give the needle and seat the necessary lapping action while at the same time providing snap movement for the benefit of the compressor. Such a combination may be produced.

It is possible to take the four parts illustrated in Fig. 1, 2, 3, and 4 and join them together in such a manner as to produce a first class snap action "leg" of a multiple temperature refrigeration system. As may be seen the parts are the simple forms of an automatic expansion valve, a thermostatic expansion valve, a pressure relief valve, and an evaporator, respectively.

While this combination will produce effective snap-action control, none of its component parts bear any snap-acting mechanism.

To build a somewhat intricate refrigeration system one must begin by assuming some simple yet pertinent facts. It is assumed that there is a compressor and a tank of brine. A manually operated control valve "A" is attached to the evaporator 4 as shown in Fig. 5.

If refrigeration is to be produced, the inside of evaporator 4 must be colder than the outside. We experiment and decide upon a 10 degree difference. With our hand on the valve "A" we hold this difference of temperature until the temperature of the brine drops to a desired low point.

Just before the compressor is stopped we make notations. The point on evaporator 4 where the refrigerant ceases to boil we mark "B." The tubing from "B" on to the compressor we now know is nothing but a suction line.

We also jot down the pressure equivalent of the evaporator's inside temperature, which we know. We call this "our lowest temperature suction pressure."

Now let us examine the automatic expansion or pressure reducing valve 1. Its needle and seat are the same as in the hand operated valve, but on the side opposite the needle and connected to it is a flexible wall. It becomes apparent that with a high pressure fluid flowing into the valve through the orifice we can produce most any desired low pressure inside merely by producing this wanted pressure in duplicate against the outer side of the flexible wall.

For this outer pressure the valve 1 uses atmospheric pressure together with either the positive or negative help of an adjustable spring. The atmospheric pressure is not necessary, but it is much more easily tolerated than dispensed with.

We connect valve 1 to evaporator 4, as shown in Fig. 6, and adjust the suction pressure until it is the same as was the lowest temperature suction pressure mentioned in connection with Fig. 5. In Fig. 6, starting the refrigeration process with a warm evaporator, we note that the terminus of the boiling refrigerant is near the top of the evaporator and the efficiency is low. As refrigeration proceeds the terminus creeps downward and the efficiency rises until finally the point "B" and full efficiency are reached, after which refrigeration is stopped.

From Fig. 6 it now becomes evident that with an automatic expansion valve the greatest efficiency may be obtained by holding the temperature differential of the evaporator 4 to a minimum. The smaller the differential the closer will the terminus of the boiling refrigerant hover to the point "B."

Fig. 7 shows how after proper adjustments have been made in the spring in valve 1, the air in the spring chamber has been replaced with a small quantity of liquid refrigerant, and the entire chamber hermetically sealed.

Thus in Fig. 7 valve 1 has been changed to a thermostatically controlled expansion valve. Except for fact that circumstances cause an irregular flow of heat in the refrigerated brine and likewise around the thermal liquid chamber the operation of Fig. 7 should closely parallel that of Fig. 5. An approximate 10 degree heat difference should exist between the inside and the outside of the evaporator 4 during the entire "on" cycle.

It should be noted that in Fig. 6 the spring governs the amount of constant suction pressure, while in Fig. 7 the same spring governs the amount of constant heat difference.

In Fig. 8 valve 3 is shown connected to evaporator 4. The performance in Fig. 8 should be closely similar to that of Fig. 7. In Valve 3 the spring shown in Fig. 7 has been moved to an accessible position while the thermal liquid chamber has been extended into a sensitive bulb with more liquid added.

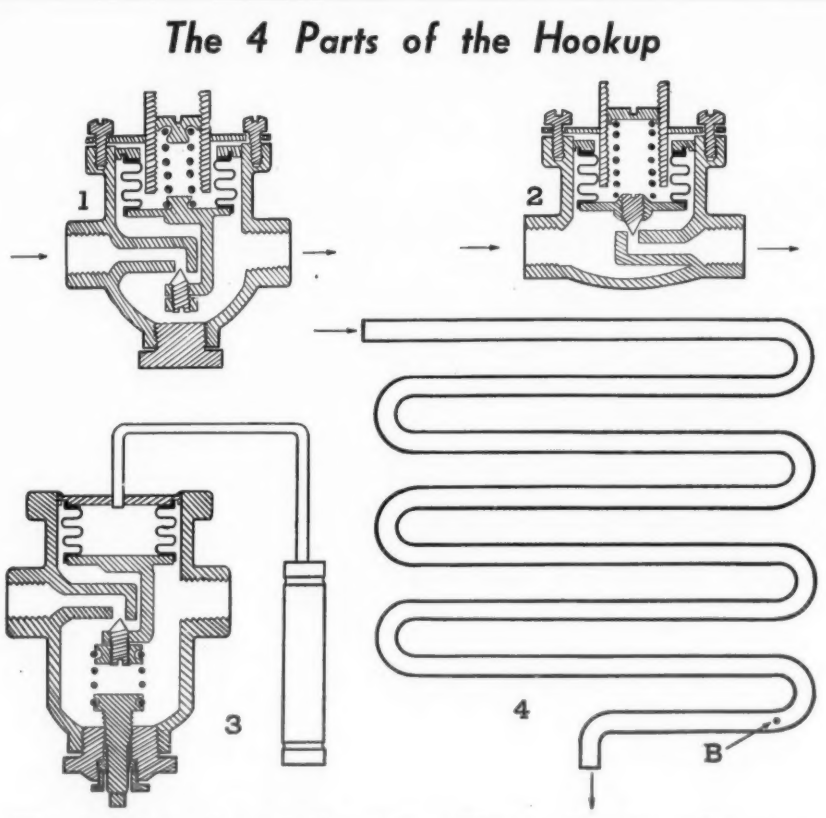
If desired valve 3 may be further modified by thermally insulating the thermostatic chamber from the valve body thus permitting the reduction of the thermal liquid to a small quantity. Even further modification may be had by proportioning the amount of thermal liquid so that it will completely evaporate at a given temperature.

In Fig. 9 valve 3 is shown with its bulb clamped to the suction line near the point "B." This arrangement gives an automatic, regular and quickly responsive thermal control of the evaporator's operation, with full efficiency at all times.

In valve 2 the structure is identically the same as in valve 1 except that the needle is placed on the side

(*Concluded on Page 12, Column 3*)

The 4 Parts of the Hookup



(Fig. 1) Automatic expansion valve. (Fig. 2) Pressure relief valve. (Fig. 3) Thermostatic expansion valve. (Fig. 4) Evaporator. Point "B" marks place where refrigeration stops.

Automatic Changed Into a Thermostatic Valve

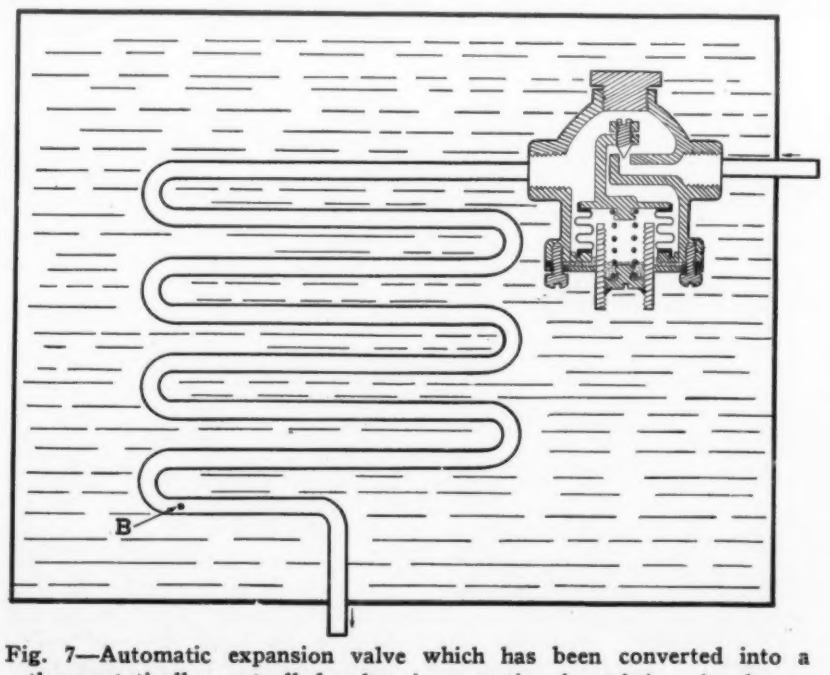


Fig. 7—Automatic expansion valve which has been converted into a thermostatically controlled valve, in operation in a brine chamber.

Manual Control

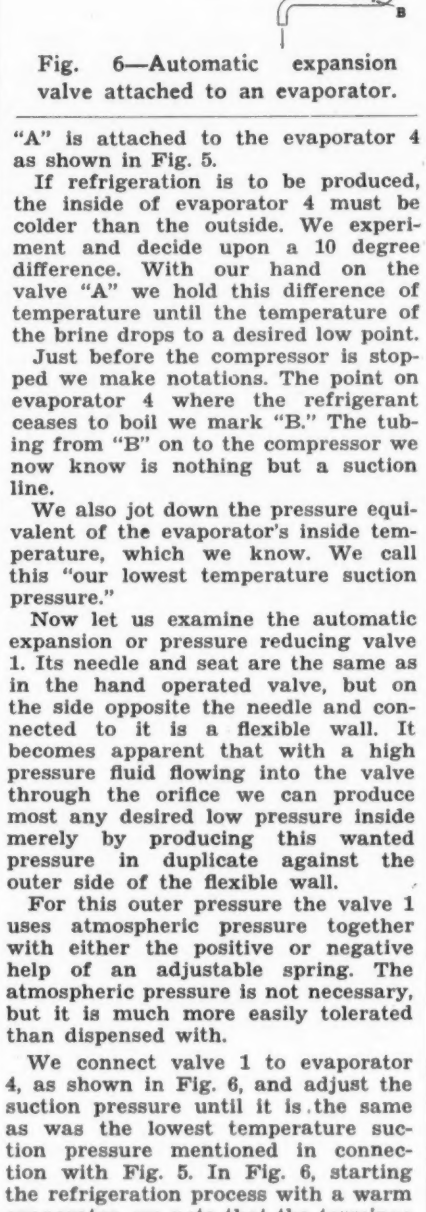


Fig. 5—Hand-operated control valve.

Automatic Control

Fig. 6—Automatic expansion valve attached to an evaporator.

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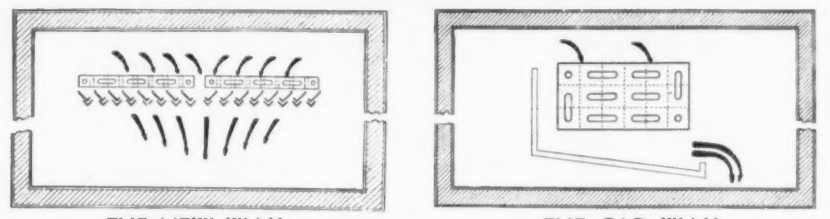

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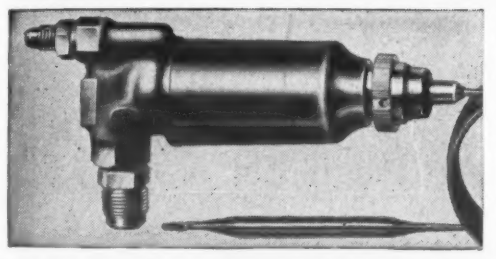

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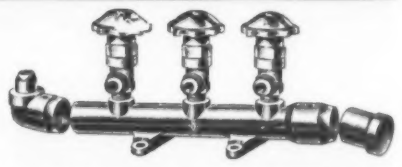

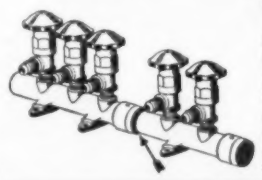

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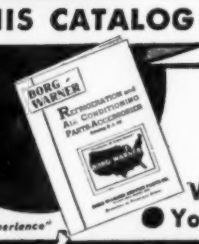

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New Type of Layout for 2-Temperature System

(*Concluded from Page 11, Column 3*)

next to, instead of away from, the flexible wall, thereby causing the needle's response to outside pressure to be directly opposite to what it was in valve 1.

For future reference it may here be noted that valve 1, while tending to constantly hold the evaporator's pressure at a given setting, never, under any circumstances, permits a lower pressure than that setting. With the compressor valve 2 in operation, while tending to hold the evaporator pressure at a given setting, never permits a higher pressure than that setting.

A single notation may be made in respect to the performance of the evaporator 4. During the refrigerating cycle the inside temperature of the evaporator is approximately 10 degrees lower than the outside. It follows that as soon as circulation of the refrigerant, and the withdrawal of heat is stopped, the inside temperature will start rising toward the outside level.

We are now ready to take up the new circuit.

Fig. 10 shows the same parts as do Fig. 1, 2, 3 and 4, but connected. The orifice of valve 3 has been enlarged and the spring checked for flexibility.

In Fig. 10 if we set valve 1 at 3 pounds pressure and if the system is warm, valve 3 being open, valve 2 being closed, and the compressor running, then refrigeration will take place. If sulphur dioxide is the refrigerant, the terminus of the boiling refrigerant will gradually work downward until it reaches point "B" at which time the temperature of the brine will be 32° F. We now adjust valve 3 until it closes. Here, for a brief instant, the bellows in valve 3 lies between two balanced forces, the evaporator pressure augmented by the spring force on the one side and the thermal pressure on the other side.

When valve 3 closes, the refrigerant in evaporator 4, being at 22° F. temperature, will boil, and the pressure will instantly start rising toward a 7 pound maximum, this being the equivalent of the brine's temperature.

This sudden rise in the evaporator pressure operates to bias the bellows of valves 1 and 3 causing their needles to close instantly and firmly, or in other words it is equivalent to a snap action. We now adjust valve 3 to a 6 pound setting thus permitting all the liquid in the evaporator 4 to evaporate and pass out leaving only enough vapor to fill it.

Whereas during the refrigerating cycle the evaporator pressure was constantly of a 3 pound value it now, during the off cycle, stays constantly at a 6 pound value. The difference between the two settings, when translated into temperatures, becomes our temperature differential. In the present instance this 3 pounds equals about 5° F.

For the instant that valve 3 first closed, the evaporator pressure (augmented by the spring force) and the thermostatic pressure were in a state of balance. But we have permitted the evaporator pressure to rise only 3 pounds, and it remains at the new level.

Hence when the thermostatic pressure rises a like amount, 3 pounds, it will overcome the evaporator pressure, opening valve 3. The instant valve 3 starts opening, the evaporator pressure drops sharply causing the bellows in valve 3 to be biased oppositely to the way it was when the valve closed.

This drop in pressure instantly moves valve 3 to wide open position with snap action quickness and permits valve 1 to again start refrigeration, completing the cycle.

When this new circuit is attached to a standard pressure controlled refrigeration system, if the pressurestat is set to cut in at 3 pounds, then the motor will always start immediately as the evaporator 4 cuts into the system. In this new circuit it will be noted that the thermostatic valve functions in a manner never assumed before. It is not only reverse order as regards refrigerant flow, but in the evaporator outlet its control mechanism is constantly in sensitive contact with the evaporator pressure.

As for the pressure relief valve, it too functions in a manner never assumed before. It stays closed during the entire refrigerating cycle and opens only during the off cycle.

The operation of the new circuit just outlined is a three way participation of the functions of an automatic expansion valve, a thermostatic valve, and a pressure relief valve. Snap action is produced, and a durable and reliable inlet metering valve, the automatic expansion valve, may be used effectively in a two-temperature circuit without the aid of a solenoid valve.

The two outlet valves used in this circuit can be combined in a single housing having a single needle and seat. Such a valve is now in the final stages of development.

Thermostatic Expansion Valve

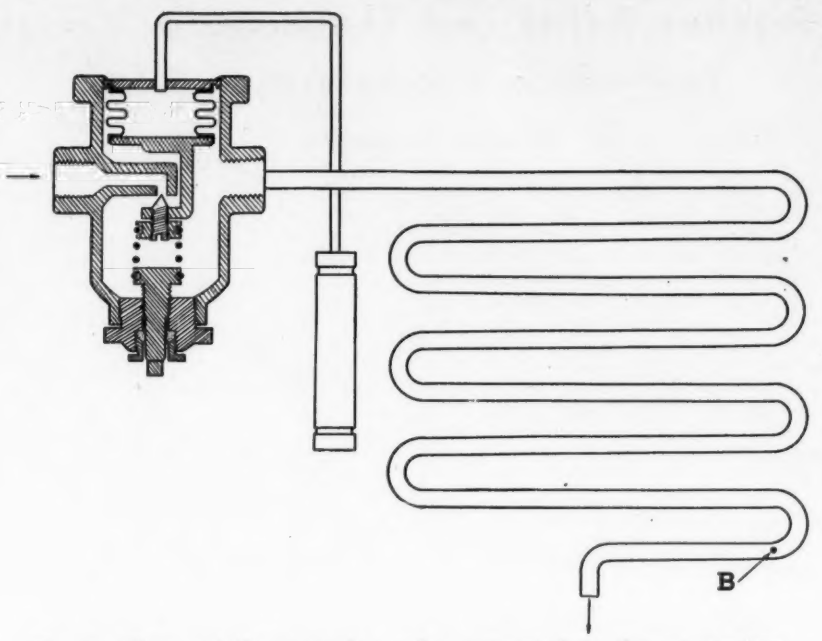


Fig. 8—Thermostatic expansion valve connected to the evaporator.

Placement of Thermal Valve's Bulb

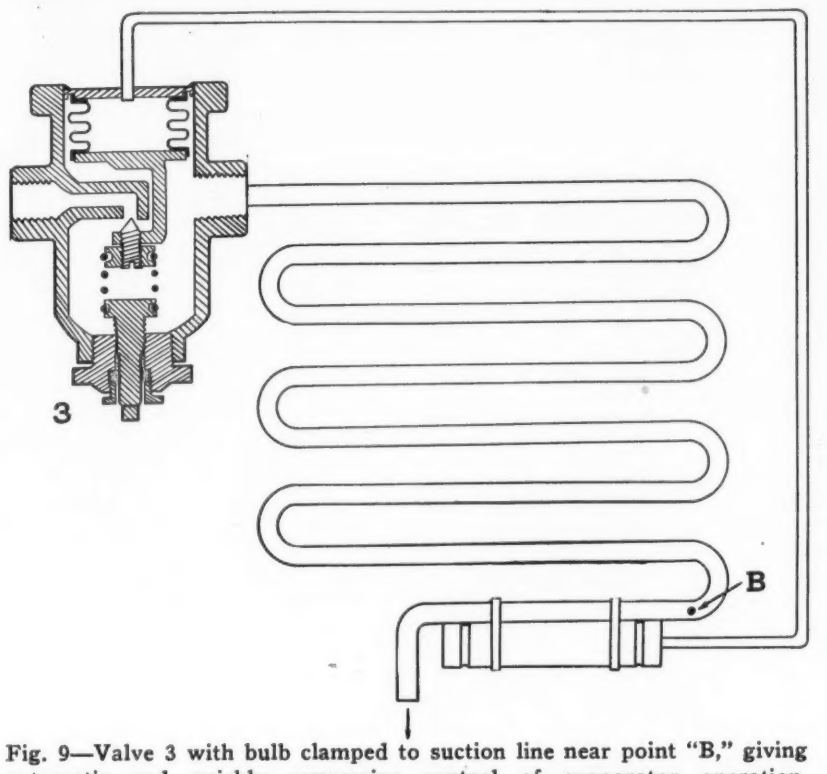


Fig. 9—Valve 3 with bulb clamped to suction line near point "B," giving automatic and quickly responsive control of evaporator operation.

Layout for Snap-Action Effect

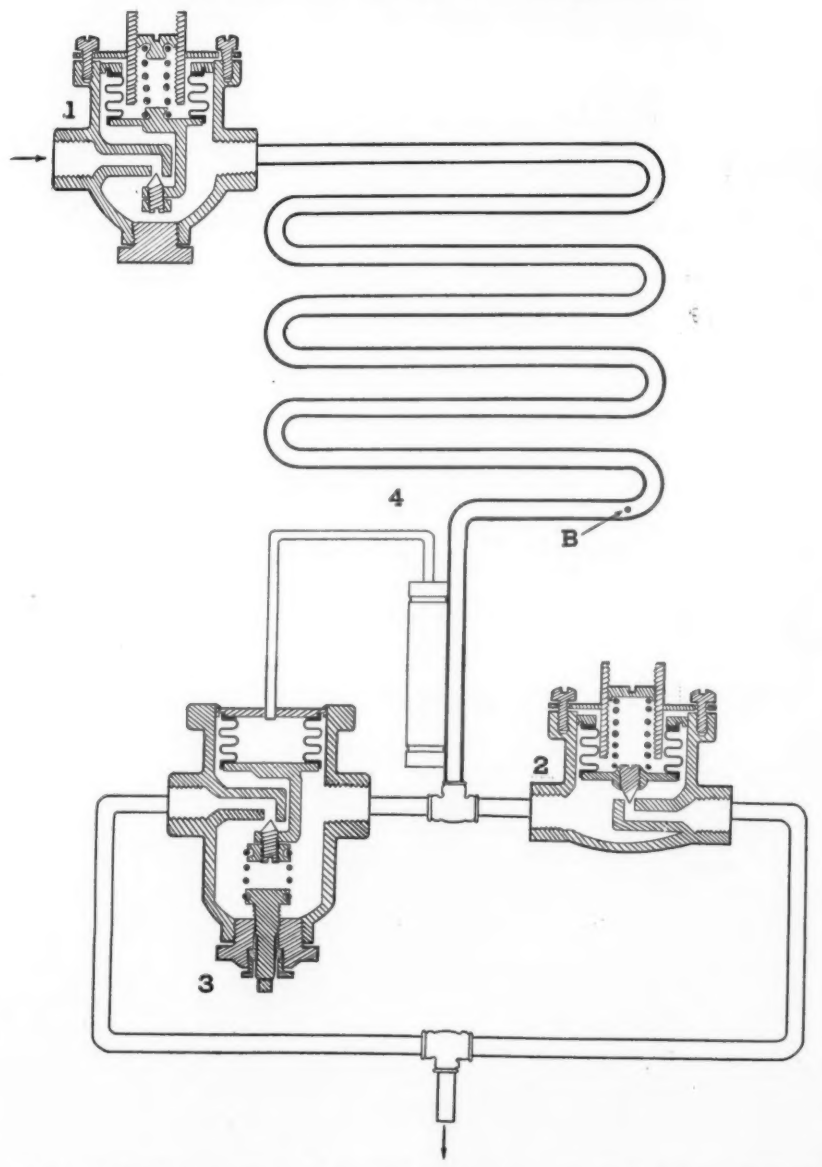
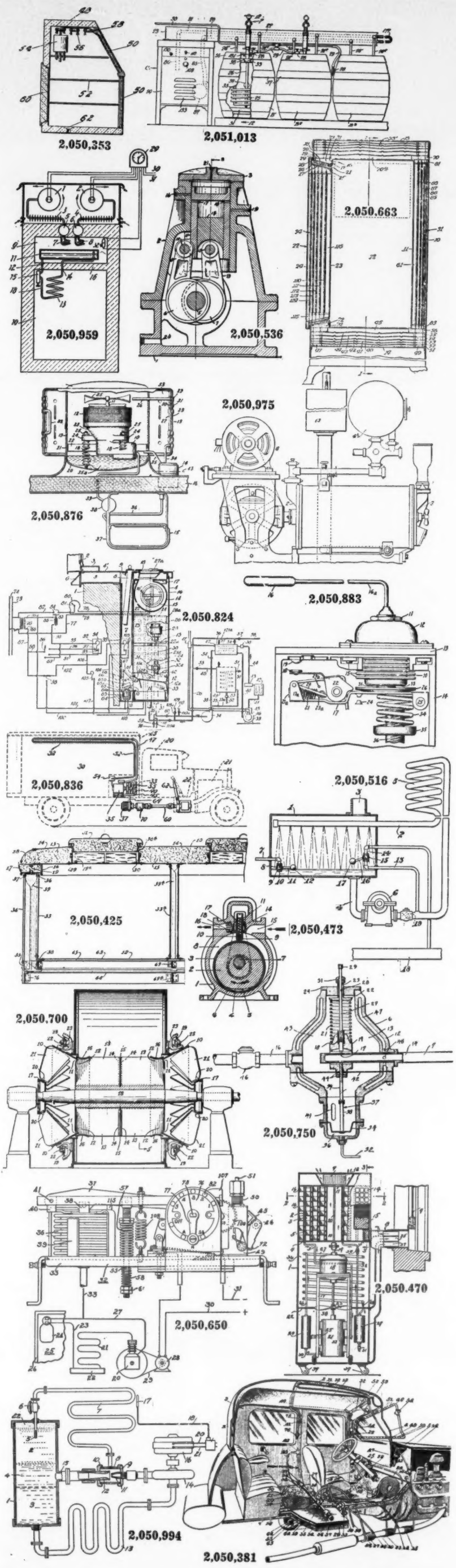


Fig. 10—Layout showing placement of valves to produce snap-action effect. Valve No. 1 (the automatic expansion valve connected to the inlet of the evaporator) functions in somewhat its accepted fashion, as does Valve No. 2 (the pressure relief valve, at the right). But Valve No. 3 (the thermostatic expansion relief valve, at the left) operates almost directly opposite the way it is used in general practice today.



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Issued August 11, 1936

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2,050,470. AIR CONDITIONING APPARATUS. Leonard C. Smith, New York, N. Y., assignor to Heating, Ventilating & Air Conditioning Co., Inc., New York, N. Y. Application Sept. 6, 1935, Serial No. 39,400. 6 Claims. (Cl. 62—129)

2,050,473. ROTARY COMPRESSOR. Karl Steinmann, Winterthur, Switzerland. Application July 22, 1935, Serial No. 32,516. In Great Britain Oct. 16, 1934. 9 Claims. (Cl. 230—149)

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2,050,536. COMPRESSOR. William A. Meyer, West Allis, Wis. Application Oct. 10, 1931, Serial No. 567,996. 1 Claim. (Cl. 230—179)

2,050,650. REFRIGERATING APPARATUS. John Ralph Fehr, Dayton, Ohio, assignor, by mesne assignments, to General Motors Corp. Application May 30, 1933, Serial No. 673,720. 17 Claims. (Cl. 62—4)

2,050,663. THERMAL INSULATION. Joseph M. Le Grand, Chicago, Ill. Application April 1, 1933, Serial No. 663,934. 17 Claims. (Cl. 189—1)

2,050,700. CENTRIFUGAL FAN. Harold F. Hagen, Dedham, Mass., assignor to B. F. Sturtevant Co., Boston, Mass. Application May 23, 1935, Serial No. 22,979. 5 Claims. (Cl. 230—114)

2,050,750. REFRIGERANT CONTROL. Thomas E. Drummond, Oakland, Calif. Application Feb. 26, 1934, Serial No. 712,961. 3 Claims. (Cl. 236—92)

2,050,824. VENTILATING AND AIR TREATING APPARATUS. George R. Atherton, Scarsdale, N. Y., assignor to American Radiator Co., New York, N. Y. Application Feb. 8, 1934, Serial No. 710,265. 5 Claims. (Cl. 257—9)

2,050,836. CLUTCH FOR REFRIGERATING APPARATUS. Frank O. Graham, Detroit, Mich., assignor to Kelvinator Corp., Detroit, Mich. Application March 28,1932, Serial No. 601,506. 4 Claims. (Cl. 192—61)

2,050,876. REFRIGERATING MACHINE. Harley H. Bixley, Schenectady, N. Y., assignor to General Electric Co. Application Sept. 24, 1935, Serial No. 41,905. 9 Claims. (Cl. 62—115)

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PATENTS

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Miller Will Represent Baltimore Distributor

BALTIMORE—Earl S. Miller has been appointed eastern shore sales representative for Baltimore Gas Light Co., distributor for Universal refrigerators, manufactured by Landers, Frary & Clark, and for Zenith and Motorola radios.

Middleman Joins Zamoiski Co.

BALTIMORE—William Middleman, formerly manager of refrigeration and radio activities for the Hub department store, has become associated with the Norge division of the Joseph M. Zamoiski Co., Baltimore Norge distributor.

Modern Home Utilities Has Kitchen Planning Dept.

HARTFORD, Conn.—Modern Home Utilities, Inc., state distributor of General Electric appliances, has launched a Kitchen Planning Bureau in charge of Gordon MacMaster, kitchen planner and practical architect.

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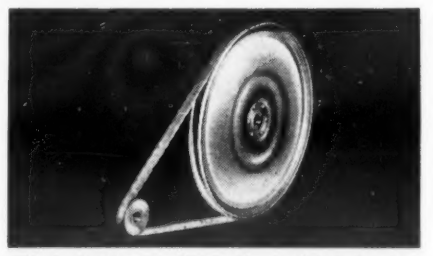

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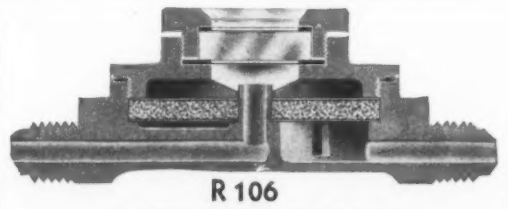

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COMMERCIAL Service Manual

By K. M. NEWCUM

Body and Housing Assemblies On Commercial Compressors

Chapter 6

Commercial Condensing Units

Commercial condensing units differ from domestic only in that they are larger and have a greater capacity to handle the larger refrigeration load to which they are connected.

The purpose of the condensing unit is to remove the heat-laden gases from the evaporator, compress them to a point where condensation takes place, at which point the gas is returned to its original liquid state so it may be used over and over again in the process of producing mechanical refrigeration.

Condensing units may vary in appearance and in other ways but their purpose remains the same. They are generally composed of the following major parts:

The base, which is usually made of cast iron, pressed steel or angle iron, serves as a frame or base onto which all the other parts are mounted.

Compressor Body

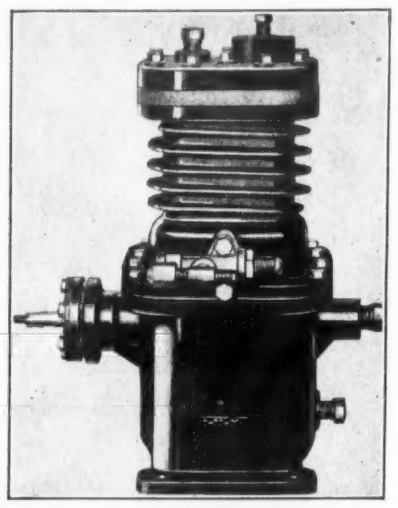

Fig. 31—A Frigidaire compressor body assembly.

The compressor, the pump for compressing the refrigerant.

The condenser, which is the heat dissipation agent.

The liquid receiver, which is the chamber for receiving and storing the liquid refrigerant produced in the condenser.

The motor, which is the driving force to propel the compressor.

There are several other minor parts which go to make up a condensing unit such as the belt, the control, service valves, etc. These parts will be dealt with separately.

Majority of commercial condensing units employ the conventional reciprocating compressor.

Compressor Body Assembly

The compressor proper includes all that part of the condensing unit which has to do with pumping the refrigerant vapor. The compressor is often referred to as the compressor body assembly, as it consists of several different parts that go to make up a complete compressor. Fig. 31 illustrates a small two-cylinder Frigidaire commercial compressor body assembly.

Commercial compressors are built with one, two, three, and four cylinders.

Compressor Housing Assembly

The compressor body housing assembly is a series of castings made of very close grain cast iron, cast semi-steel, or cast nickel iron. The castings are necessarily hard and dense so as to reduce porosity to an absolute minimum to preclude the possibility of refrigerant and oil leaks through these castings, which are at all times exposed to the refrigerant under variable pressure conditions.

The housing assembly is built in two or more parts. Some designs have the cylinder block and crankcase as two separate parts such as the York compressor body shown in Fig. 32, while other designs have the crankcase cylinder block integral—see Fig. 33.

Where the crankcase and cylinder block are integral, such as the Universal Cooler assembly shown in Fig. 33, there is always a removable bottom plate which, when removed, makes the connecting rod or eccentric strap and piston assembly accessible for assembling or servicing.

In a design where the cylinder block and crankcase are separable, Fig. 34, there will not be a removable bottom plate as the piston, connecting rod and other parts may be reached by removing the cylinder from the crankcase.

The type of connecting rod employed also affects the compressor housing design. For example, if the compressor is of the crankshaft type, such as shown in Fig. 33, a removable housing cover will be found on the side of the crankcase. This is necessary on the crankshaft type to provide space to install or remove the crankshaft.

Where the eccentric is employed as shown in Fig. 34, this large opening is not required and the removable housing cover will not be found on the assembly.

A thorough understanding of the factors affecting the housing design will enable the service man to readily distinguish between a crankshaft and eccentric compressor without disassembling it. Often this is of value in locating and determining compressor knocks, and in estimating on over-haul jobs requiring new compressor parts.

The gasket surfaces are machined smooth and true to assure proper

Crankshaft Type Assembly

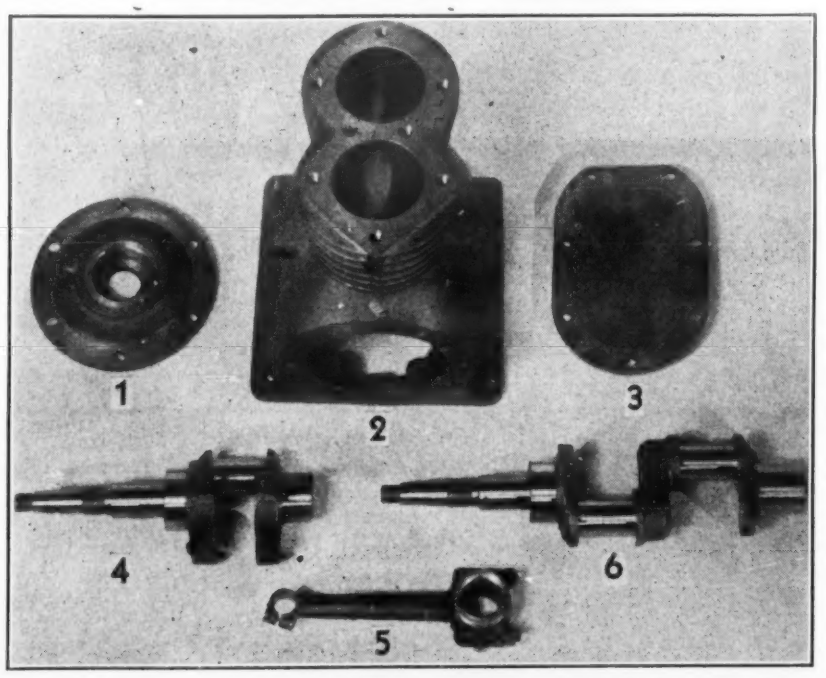

Fig. 33—Parts of crankshaft type compressor assembly are (1) bottom plate; (2) cylinder and crankcase integral; (3) housing cover; (4) single crank with counter balance; (5) typical connecting rod; (6) double crank.

York Compressor

Fig. 32—York compressor showing how the crankcase and cylinder block are made in two separate parts.

alignment. Of great importance on the separable type is the thickness and type of gasket used between the crankcase and cylinder block. The thickness of this gasket, when the bolts are tightened, determines the clearance between the top of the piston and the top of the cylinder. Care should be used in selecting this gasket and the clearance should be checked after the cylinder has been reassembled.

The cylinder walls are machined to very close tolerances and are usually lapped by one of several processes to a high polished surface to provide a close, true fit for the pistons. Tolerances on refrigeration compressors do not have to be as great as on automobile engines, as the operating temperatures at the cylinder walls are much less, due to the fact that combustion heat does not have to be considered.

The outside of the cylinder walls are usually cast in such a manner that the surface is irregular taking the shape of fins. (See Fig. 31, 32, 33, and 34.) This is to add heat dissipating surface near the point of friction between the piston and cylinder wall, and to aid in dissipating the heat caused by compression. Such

Cutaway View

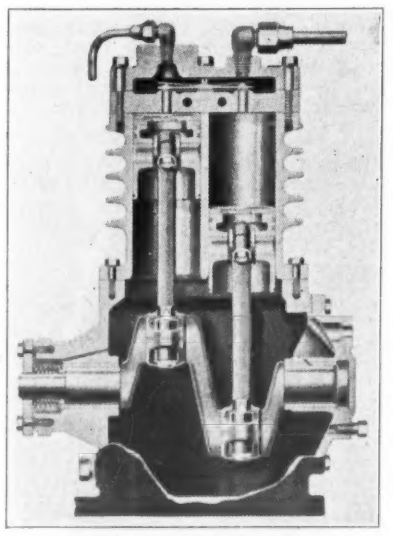

Fig. 35—Cutaway of Frigidaire compressor showing separable cylinder and removable housing cover.

design also tends to strengthen the cylinder casting at this point.

The compressor housing assembly also provides the main bearing surfaces for the crank or eccentric shaft. Some of the smaller commercial compressors employ the cast iron of the housing, properly machined as the main bearing surfaces, while the large majority of compressors are equipped with bronze or other alloy main bearings. (Some compressors use the Timken tapered roller bearings.) These bearings are line reamed.

On the separably eccentric type (Fig. 34) both main bearings are in the one piece crankcase and cannot get out of alignment through ordinary service. On the crankshaft type (Fig. 32 and 33) one main bearing is in the crankcase proper, while the other main bearing is in the removable housing cover. It is important in reaming the bearings, and also in assembling the compressor, that this housing eover be in positive alignment.

Fig. 35 shows a cutaway view of a Frigidaire compressor showing the separable cylinder, and removable

(Concluded on Page 15, Column 1)

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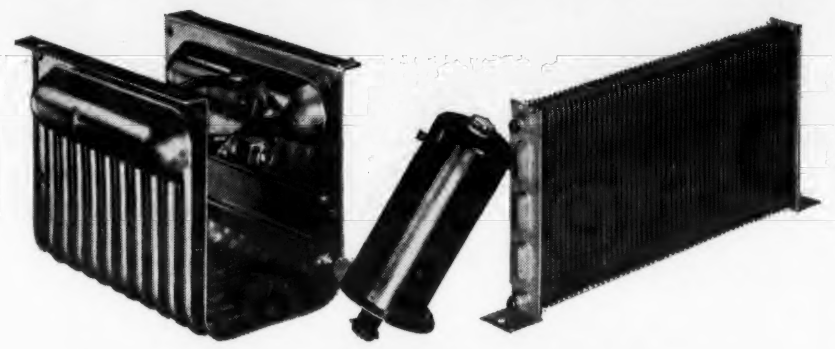

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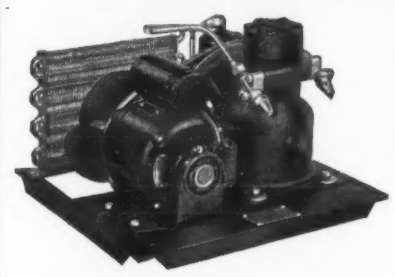

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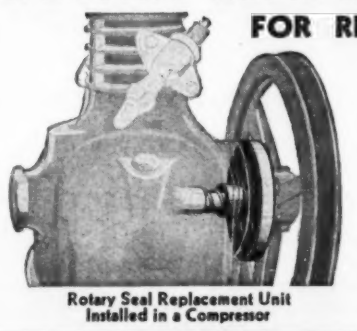

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Eccentric Type Assembly

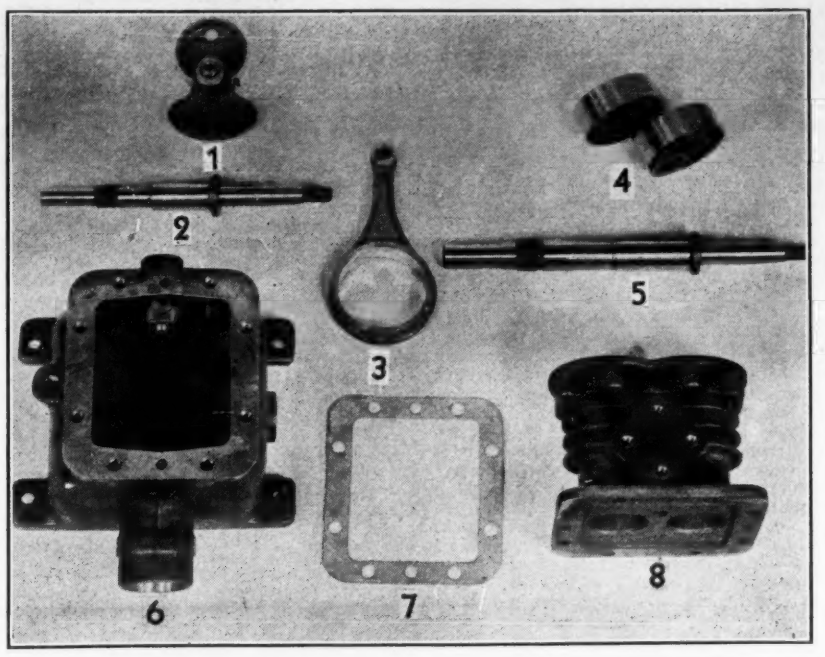

Fig. 34—Compressor housing assembly, eccentric type, and parts. (1) a single eccentric; (2) a single eccentric shaft; (3) a typical eccentric type connecting rod; (4) a double eccentric; (5) a double eccentric shaft; (6) crankcase; (7) crankcase-to-cylinder head gasket; (8) cylinder block.

* * *

Lubrication Systems Used in Commercial CondensingMachines

(*Concluded from Page 14, Column 3*)

housing cover. (Crankshaft type.) Note the oil passages to both of the main bearings, which is supplied by the splash system.

The oil level in this compressor is such that the connecting rods dip into the oil, causing it to be splashed around to lubricate all the moving parts.

Note in Fig. 32 that crankcase is equipped with a bullseye for readily determining the oil level. Where compressors are equipped with bullseyes for determining the oil level, it is assumed that the proper level, when the compressor is in normal operation, is in the center of the bullseye. The oil level may vary slightly, but as long as the level may be seen in the bullseye, it is within safe limits.

Curtis compressors employ the Timken roller bearings and the oil is supplied to the compressor parts by means of a ring between the two connecting rods. With this design, the oil level is below the connecting rods and the level is readily visible through the bullseye.

Kerotest Develops Relief Valve for Small Cylinders

PITTSBURGH—Kerotest Mfg. Co., in cooperation with some of the manufacturers of refrigerants, has developed a relief valve incorporating a spring loaded safety device, designed for use by servicemen to prevent overheating and explosion to small refrigerant cylinders.

The valve has a ⅜-in. male taper pipe thread connection to fit into the opening of these small cylinders, and a ⅜-in. female pipe connection on the other end to the receive the standard angle or Y-shaped valve, with the safety valve interposed between the drum and cylinder valve—the internal cylinder pressure point.

Numerous accidents have been caused in the past by servicemen overheating 5 and 10-lb. refrigerant drums, and developing internal pressure beyond their safe limits, Kerotest engineers point out.

The valve first starts to leak and bubble at from 350 to 375 lbs., pressure per sq. in., and opens wide at from 410 to 425 lbs. pressure. Only excessive pressure is released.

The valve contains a synthetic rubber seat, suitable for use with SO_2, methyl chloride, Freon, and isobutane. Other styles of valves incorporating the same spring loaded feature have been tested and approved by the Bureau of Explosives and Underwriters' Laboratories, Inc.

Leland Markets New Thermal Release Switch

DAYTON—Leland Electric Co. has developed a new thermal release switch for use on motors with ratings of ⅛ to 1 hp., designed to prevent burning-out of the motor because of the heavy current encountered during starting conditions, as well as from internal motor heat due to heavy running overloads.

The switch incorporates many of the principles used on the gasoline pump motor thermal release, developed by Leland in 1931, and includes additional features to give the motor protection during the starting period, Leland engineers claim.

Fire hazard from motor burnouts has increased in the last few years, due principally to the greater number of automatic-starter devices in use. National Board of Fire Underwriters' 1935 code specifies that one of two protective devices be used: a thermal protective unit, built into the motor, or a superlag fuse or breaker in the line to the motor.

In the case of a plugged-in appliance, such as a refrigerator, the protection must be built into either the appliance or the motor.

The Leland thermal release is designed to meet the requirements of motors provided with "inherent overheating protection," according to company engineers; it is not an overload protection. It is so constructed that the line circuit will be broken when the motor windings reach a temperature between 103 and 110° C., several degrees below the temperature at which the windings begin to char.

In operation, when the motor is running, any sudden rise in temperature is picked up by the thermal bar and transferred to the fusible alloy. Before internal heat is high enough to damage motor windings, the fusible alloy melts, permitting rotation of the solder pot and cam assembly in such a way as to break the contact between the movable and stationary springs.

In the case of split phase or capacitor motors in their stalled rotor conditions, where there is usually a high temperature differential between the motor windings and the areas surrounding the thermal bar, winding of a resistance wire, placed on the thermal bar and connected in series to the motor, is used. The fusible alloy in the pot is then melted by the heat furnished by the resistance wire winding, and the action is the same as in the first instance.

The release switch is trip-free, in that it cannot be reset or the circuit reclosed as long as the solder is in a molten state; that is, if the motor parts are at dangerously high temperatures. It must be reset by hand, so that if it trips frequently, the trouble will be called to the attention of a service man.

Questions

Obsolete Refrigerators

No. 2899 (Distributor, Illinois)—"May we have a list of the obsolete refrigerators, manufacturers of which have passed out of the picture?"

Answer: A complete list of defunct refrigerator manufacturers is contained in the Sept. 5, 1934, issue of ELECTRIC REFRIGERATION NEWS. Back issues of the NEWS are obtainable at the cost of 10 cents each.

This information (revised) will also be given in the new SPECIFICATIONS BOOK now on the press.

Ice Cube Evaporators

No. 2900 (Exporter, New York)—"Will you please advise which of the manufacturers you have listed under 'Cooling Units' have in their line ice cube evaporators, apart from Fedders, Detroit Lubricator, McCord, and Peerless?"

Answer: Other manufacturers include the following:

Mullins Mfg. Corp.
S. Ellsworth Ave., Salem, Ohio.

Perfex Radiator Co.
415 W. Oklahoma Pl., Milwaukee, Wis.

Refrigeration Appliances, Inc.
1342 West Lake St., Chicago, Ill.

The Starr Co., Richmond, Ind.

Trenton Auto Radiator Works
626 Brunswick Ave., Trenton, N. J.

Sales in Two Cities

No. 2901 (Reader, Minnesota)—"As subscribers to your paper we would like to get some information. How many electric and gas refrigerators were sold in St. Paul in 1935? How many in Minneapolis? Have you any data on how many replacements this included?"

Answer: We do not know.

Liquid Line Dehydrators

No. 2902 (Manufacturer, Michigan)—"Could you supply us with a list of manufacturers of refrigerant liquid line dehydrators?"

Answer: A list of manufacturers of dehydrators is contained on page 333 of the 1935 REFRIGERATION AND AIR CONDITIONING DIRECTORY.

Kulair Parts

No. 2903 (Service Firm, Massachusetts)—"Would it be possible for you to advise us where we can buy parts for Kulair refrigerating systems. We have several pumps to fix up and find this company went out of business in 1932."

Answer: We suggest that you try the Starr Co., Richmond, Ind.

Ilg Address

No. 2904 (Manufacturer, Missouri)—"We note an article in your Aug. 12 issue by the Ilg Electric Ventilating Co. in which they offer to mail catalogs to readers free of charge.

"However, inasmuch as we do not find the company's address we are writing you in hopes you will be able to forward our request to them for two of their No. 436 catalogs, one for our production department and one for our engineering department."

Answer: Ilg Ventilating Co. is located at 2850 North Crawford Ave., Chicago, Ill.

Total Texas Sales

No. 2905 (Reader, Texas)—"Please wire the total number of household refrigerators sold by members of Nema in Texas to date this year as compared with the same period last year."

Answer: First six months sales last year was 40,253; this year, 54,512.

Commercial Coin Meters

No. 2906 (Manufacturer, Ohio)—"We would greatly appreciate it if you would mail us the names of the manufacturers of meters that are used on commercial display cases."

Answer: See below.

No. 2907 (Manufacturer, Texas)—"Can you give us the names of several manufacturers of electric quarter meters for use with electric refrigeration on commercial compressors. These meters are installed on the power line, so that the customer makes payments by depositig quarters in the meters, and only by depositing these quarters can he secure current to operate his machine."

Answer: Following companies manufacture electric coin meters for commercial installations:

Bugetklok Co.
915 Washington Ave., S.
Minneapolis, Minn.

General Electric Co.
Industrial Dept.
Schenectady, N. Y.

International Register Co.
15 S. Throop St., Chicago, Ill.

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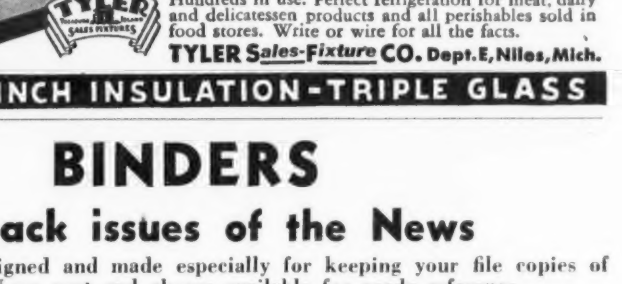

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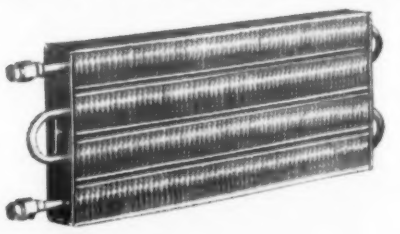

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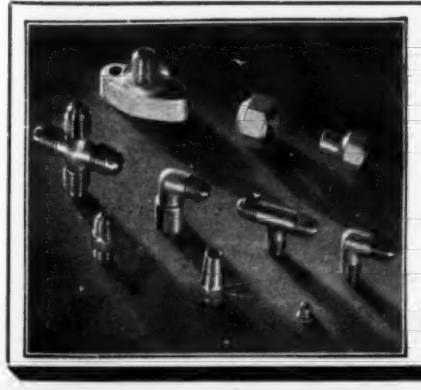

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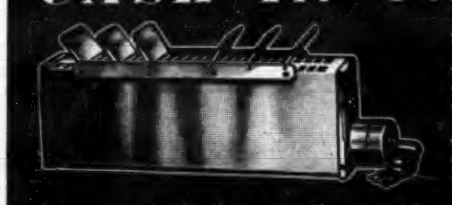

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